GOVT. HOLKAR (MODEL AUTONOMOUS) SCIENCE COLLEGE, INDORE

COURSE OUTCOMES

INTERNAL QUALITY ASSURANCE CELL

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Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (I Semester)

Course Name: Digital Computer Organization (Major)

Course Code: S1- BCA1T

Course Outcomes: -

CO1: Understand the basic structure. operation and characteristics of digital computer.

CO2: Be able to design simple combinational digital circuits based on given parameters.

CO3: Familiarity with working of arithmetic and logic unit as well as the concept of pipelining.

CO4: Know about hierarchical memory system including cache memories and virtual memory.

CO5: Understand concept and advantages of parallelism. threading. multiprocessors and multicore processors.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (I Semester)

Course Name: Programming and Problem Solving through C (Minor)

Course Code: S1- BCA2T

Course Outcomes: -

CO1: Develop simple algorithms and flow charts to solve a problem with programming using top-down design principles.

CO2: Writing efficient and well-structured algorithms/programs.

CO3: Learn to formulate iterative solutions and array processing algorithms for problems.

CO4: Use recursive techniques. pointers and searching methods in programming

CO5: Will be familiar with fundamental data structures. Their implementation: become accustomed to the description of algorithms in both functional and procedural styles

CO6: Have knowledge of complexity of basic operations like insert. delete, and search on these data structures.

CO7: Possess ability to choose a data structure to suitably model any data used in computer applications.

CO8: Design programs using various data structures including hash tables. Binary and general search trees. heaps. graphs etc.

CO9: Assess efficiency trade-offs among different data structure implementations.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (I Semester)

Course Name: Probability and Statistics (Open Elective)

Course Code: S1- BCA3T

Course Outcomes: -

CO1: Understand basic theoretical and applied principles of statistics needed to enter the job force.

CO2: Communicate key statistical concepts to non-statisticians.

CO3: Gain proficiency in using statistical software for data analysis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (II Semester)

Course Name: Programming Methodologies and Data Structure (Major)

Course Code: S2- BCA1T

Course Outcomes: -

CO1: Develop simple algorithms and flow charts to solve a problem with programming using top-down design principles.

CO2: Writing efficient and well- structured computer algorithms/programs.

CO3: Learn to formulate iterative solutions and array processing algorithms for problems.

CO4: Use recursive techniques. pointers and searching methods in Programming.

CO5: Will be familiar with fundamental data structures, their implementation: become accustomed to the description of algorithms in both functional and procedural styles.

CO6: Have knowledge of complexity of basic operations like insert. delete, and search on these data structures.

CO7: Possess ability to choose a data structure to suitably model any data used in computer applications.

CO8: Design programs using various data structures including hash tables.

CO9: Assess efficiency trade-offs among different data structure implementations.

CO10: Implement and know the applications of algorithms for searching and sorting etc.

CO11: Know the contributions of Indians in the field of programming and data structures.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (II Semester)

Course Name: Operating System (Minor)

Course Code: S2- BCA 2T

Course Outcomes: -

CO1: Describe the importance of computer system resources and the role of operating system in their management policies and algorithms.

CO2: Specify objectives of modem operating systems and describe how operating systems have evolved over time.

CO3: Understand various process management concepts and can compare various scheduling techniques synchronization, and deadlocks.

CO4: Describe the concepts of memory management techniques.

CO5: Identify the best suited process management technique for any process.

CO6: Describe various file operations. file allocation methods and disk space management.

CO7: To understand and identify potential threats to operating systems and the security features to guard against them.

CO8: Learn to operate the Linux system

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (II Semester)

Course Name: Computational Mathematics (Open Elective)

Course Code: S2- BCA 4T

Course Outcomes: -

CO1: Implement trigonometric solutions for measurements in real world scenarios.

CO2: Implement matrices and solve complex problems.

CO3: Use statistical tools efficiently.

CO4: Use Mathematical Logic and predicate calculus for solving problems.

CO5: Apply the concepts of set theory for finding solutions to set related problems.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (II Semester)

Course Name: Discreate Mathematics (Open Elective)

Course Code: S2- BCA 5T

Course Outcomes: -

CO1: Apply the Boolean algebra. switching circuits and applications.

CO2: Minimize the Boolean Function using Kamaugh Map.

CO3: Understand the lattices and their types.

CO4: Graphs. their types and its applications in study of shortest path algorithms.

CO5: Test whether two given graphs are isomorphic.

CO6: Understand the Eulerian and Hamiltonian graphs.

CO7: Represent graphs using adjacency and incidence matrices.

CO8: Understand the discrete numeric functions and Recurrence Relations

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (II Semester)

Course Name: Numerical Methods (Open Elective)

Course Code: S2- BCA6T

Course Outcomes: -

CO1: Understand numerical methods to find the solution of a system of linear equations.

CO2: Compute interpolation value for real data'

CO3: Find quadrature by using various numerical methods.

CO4: Solve system of linear equations by using various numerical techniques.

CO5: Obtain solutions of ordinary differential equations by using numerical methods.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.C.A. (III Semester)

Course Name: Discrete Mathematics

Course Code: 351

Course Outcomes: -

CO1: **To understand** algebra of Logic, Tautologies contradiction and programming language. Boolean Algebra is bone **to develop** binarycode for computer.

CO2: **Introduction** to set theory, operations and Mathematical reasoning explained in this unit. It is used to solve different problem.

CO3: **Provide** knowledge of basics of counting. The sum rule, the productrule Pigen hole Principle permutations with repetitions. Applications of combinatorics **to solve** committee problems, word problems etc.

CO4: Knowledge of Relation Importance of relation in computer science. Types of relation and their applications is basis of this unit.

CO5: Graph theory is useful in time scheduling problem. In this unit student learn terminology of graph, types of graphs, graph coloring, Tree and its properties. Language and Grammar is the basis for development of programming Language.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (III Semester)

Course Name: Data Structure Using C

Course Code: 352

Course Outcomes: -

CO1: Introduction to C, key concepts of object-oriented programming, unformatted & formatted console I/O operations.

CO2: Understanding parts of C program, tokens, operators, Control structures.

CO3: Implementing Functions, function overloading, demonstration of Classes and objects, implementing abstraction using access specifies.

CO4: Student will gain knowledge about Operator overloading, reusing code through Inheritance and its types.

CO5: They will work with Pointer & Arrays of classes, implementing Polymorphism, Template, and Handling Exceptions

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (III Semester)

Course Name: Object Oriented Programming Using C++

Course Code: 353

Course Outcomes: -

CO1: Introduction to stack, stack application, introduction to queues, applications of queue.

CO2: Introduction to linked list, dynamic m/r allocation.

CO3: Concept of non-linear data structure, Tree-basic terminology, Applications of binary tree.

CO4: Searching and sorting techniques, analysis of various searching and sorting algorithms, algorithm design.

CO5: Introduction to Graphs, graph traversal, shortest path algorithm, hashing.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (III Semester)

Course Name: Unix operating system

Course Code: 354

Course Outcomes: -

CO1: Learn UNIX structure, commands, and utilities.

CO2: Describe and understand the UNIX file system.

CO3: Write shell scripts in order to perform shell programming.

CO4: Acquire knowledge about text processing utilities, process management and system operation of UNIX.

CO5: Installation of software's and hardware's on Unix operating system.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (III Semester)

Course Name: Accounting and financial management

Course Code: 355

Course Outcomes: -

CO1: Demonstrate the role of accounting in business in economic world.

CO2: Explain the principles of accounting and book keeping.

CO3: Apply accounting rules in determining financial results and preparation of financial statement.

CO4: Rectify errors caused during preparation of Final accounts.

CO5: Use software in preparation of Financial Statements.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (III Semester)

Course Name: Communication skill

Course Code: 356

Course Outcomes: -

CO1: Students will be able to understand and apply knowledge of human communication.

CO2: Student will learn how to use language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication, etc. from multiple perspectives.

CO3: Presentation skills training courses provide strategies to plan, structure and deliver powerful presentations.

CO4: Student will Learn how to structure presentations in order to deliver effective messages as well as receive the coaching to dramatically improve your personal presentation.

CO5: They will implement specific program is one of the leading presentation skills training courses developed to help people engage audiences.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (IV Semester)

Course Name: Computer Oriented Numerical Methods

Course Code: 451

Course Outcomes: -

CO1: To develop the mathematical skills of the students in the areas of numerical methods.

CO2: To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems.

CO3: Finding Eigen values, eigenvectors, interpolation and applications, solving ODEs, PDEs.

CO4: To lay foundation of computational mathematics for post-graduate courses specialized studies and research.

CO5: Dealing with statistical problems like testing of hypotheses.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (IV Semester)

Course Name: Software Engineering

Course Code: 452

Course Outcomes: -

CO1: Understand the importance of the stages in the software life cycle.

CO2: Understand the various process models.

CO3: Be able to design software by applying the software engineering principles.

CO4: To understand important concepts of software engineering and project management.

CO5: Introduction of management information system.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (IV Semester)

Course Name: Database Management System

Course Code: 453

Course Outcomes: -

CO1: Demonstrate the basic elements of a relational database management system.

CO2: Students will acquire knowledge of data models for relevant problems.

CO3: Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.

CO4: Demonstrate their understanding of key notions of query evaluation and optimization techniques.

CO5: Extend normalization for the development of application software ‘s.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (IV Semester)

Course Name: Programming with java

Course Code: 454

Course Outcomes: -

CO1: The students will have the competence in the use of Java Programming language.

CO2: The development of small to medium sized application programs that demonstrate professionally acceptable coding.

CO3: An understanding of the principles and practice of object-oriented programming in the construction of robust maintainable programs which satisfy the requirements.

CO4: Design and implement an application that demonstrates their competency with Java syntax, structure and programming logic, incorporating basic features of the language as well as some features from the I/O (Input/Output) or GUI libraries

CO5: Competence in the use of Java Programming language in the development of small to medium sized application programs that demonstrate professionally acceptable coding and performance standards.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (IV Semester)

Course Name: Environment Awareness And Green Computing

Course Code: 455

Course Outcomes: -

CO1: Understand the concept of green IT and relate it to sustainable development

CO2: Apply the green computing practices to save energy.

CO3: Discuss how the choice of hardware and software can facilitate a more sustainable operation.

CO4: Use methods and tools to measure energy consumption

CO5: Understand benefits of renewable and sustainable energy systems.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.C.A. (V Semester)

Course Name: Linear Algebra and Geometry

Course Code: 551

Course Outcomes: -

CO1: To define Groups, Subgroups, Normal subgroups, Quotient group and their properties.

CO2: To define Vector Spaces, Quotient space and their properties.

CO3: To use matrix representation of a Linear transformation, its rank, nullity, Eigen values and Eigen vectors.

CO4: To describe Elliptical and Hyperbolic Paraboloids, Ellipsoid and their Tangential planes.

CO5: To describe Cones, Enveloping Cones and Cylinders of conicoid.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (V Semester)

Course Name: Computer Network

Course Code: 552

Course Outcomes: -

CO1: Explain the importance of data communications and the Internet in supporting business Communications and daily activities.

CO2: Analyze the services and features of the various layers of data networks.

CO3: Explain how communication works in data networks and the Internet.

CO4: Recognize the different internetworking devices and their functions.

CO5: Explain the role of protocols in networking.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (V Semester)

Course Name: Introduction to Cloud Computing

Course Code: 553

Course Outcomes: -

CO1: The fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenge.

CO2: Student will gain knowledge about the basic ideas and principles in data centre design; cloud management techniques and cloud software deployment considerations;

CO3: Student will acquire knowledge about Different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks (SDN) and Software Defined Storage.

CO4: Knowledge of cloud storage technologies and relevant distributed file systems, NoSQL databases and object storage.

CO5: The variety of programming models and develops working experience in several of them.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (V Semester)

Course Name: Introduction to Data Science

Course Code: 554

Course Outcomes: -

CO1: Students will develop relevant programming abilities.

CO2: Students will demonstrate proficiency with statistical analysis of data.

CO3: Students will develop the ability to build and assess data-based models.

CO4: Students will execute statistical analyses with professional statistical software.

CO5: Students will demonstrate skill in data management.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (V Semester)

Course Name: Human Values and Professional Ethics

Course Code: 555

Course Outcomes: -

CO1: To understand professional responsibility of a student.

CO2: To appreciate ethical norms.

CO3: To appreciate ethical dilemma while discharging duties in professional life.

CO4: To understand Attitude formation and function.

CO5: To understand moral value and character Building.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (V Semester)

Course Name: Information Technology Trends

Course Code: 556

Course Outcomes: -

CO1: To make students well versed in all data mining algorithms, methods of evaluation.

CO2: To impart knowledge of tools used for data mining

CO3: To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.

CO4: To impart skills that can enable students to approach business problems analytically by identifying opportunities to derive business.

CO5: Understand the fundamentals of wireless networks.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (VI Semester)

Course Name: Operational Research

Course Code: 651

Course Outcomes: -

CO1: To impart knowledge in concepts and tools of Operations Research.

CO2: To understand mathematical models used in Operations Research.

CO3: To apply these techniques constructively to make effective business decisions.

CO4: Solving questions related to resources' operations such as: human, machine, materials, energy, information, and funds.

CO5: Solving operational questions and decision-making questions.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (VI Semester)

Course Name: Internet and web designing using PHP

Course Code: 652

Course Outcomes: -

CO1: Understand how server-side programming works on the web.

CO2: PHP Basic syntax for variable types and calculations.

CO3: Using PHP built-in functions and creating custom functions

CO4: How to receive and process form submission data. and reading and writing cookies.

CO5: Create a database in phpMyAdmin. Read and process data in a MySQL database.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (VI Semester)

Course Name: Computer Graphics and Multimedia

Course Code: 653

Course Outcomes: -

CO1: Students will demonstrate an understanding of contemporary graphics hardware.

CO2: Students will create interactive graphics applications in C++ using one or more graphics.

CO3: Students will create interactive graphics applications in C++ using one or more graphics application programming interfaces.

CO4: Students will write program functions to implement graphics primitives.

CO5: Students will write programs that demonstrate geometrical transformations.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.C.A. (VI Semester)

Course Name: Principles and Practices of management

Course Code: 654

Course Outcomes: -

CO1: To understand nature, Characteristics, Function, Importance of management.

CO2: To understand Planning and component, Objectives of business.

CO3: To understand organizing, Departmentation and staffing.

CO4: To understand principle of Direction and human Relation.

CO5: To understand and implements technique of control in management.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (Biochemistry Major)

Course Name: Biochemical Techniques (Major)

Course Code: S1-BCH1T

Course Outcomes: -

CO1: Demonstrate knowledge and understanding of essential laboratory techniques used in various scientific disciplines. (Understanding)

CO2: Apply laboratory skills and techniques in practical settings, including working in laboratory and research and development (R&D) departments of different industries. (Applying)

CO3: Utilize technological skills acquired through the course to effectively perform laboratory experiments and analyze data. (Applying)

CO4: Evaluate and apply various techniques for the separation and characterization of different biological molecules, gaining practical experience in their application. (Analyzing)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (Biochemistry Major)

Course Name: Chemistry of Biomolecules (Minor)

Course Code: S1-BCH2T

Course Outcomes: -

CO1: Understand the significance of biological molecules and their essential role in the maintenance of life processes. (Understanding)

CO2: Gain knowledge and enthusiasm for DNA, RNA, vitamins, and lipids, and comprehend their importance within biological systems. (Understanding)

CO3: Explore the properties of biomolecules, which serve as a foundation for conducting various scientific studies. (Applying)

CO4: Develop the skills necessary to engage in research across diverse fields, recognizing that biomolecules form the fundamental basis of all scientific investigations. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (Biochemistry Major)

Course Name: Basic of Biochemistry (Open Elective)

Course Code: S1-BCH3T

Course Outcomes: -

CO1: Understand the significance of biological molecules and their crucial role in maintaining life processes. (Understanding)

CO2: Gain enthusiasm and knowledge about the importance of DNA, RNA, vitamins, and lipids in biological systems. (Understanding)

CO3: Explore the intricate properties of biomolecules and their applications in conducting diverse scientific studies. (Applying)

CO4: Develop the foundation necessary to pursue research in any field, recognizing that biomolecules serve as the fundamental building blocks of scientific investigations. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (Biochemistry Major)

Course Name: Chemistry of Biomolecules (Major)

Course Code: S2-BCH1T

Course Outcomes: -

CO1: Understand the significance of biological molecules and their critical role in maintaining life processes. (Understanding)

CO2: Enthusiastically explore the intricacies of DNA, RNA, vitamins, and lipids, and their profound importance in biological systems. (Understanding)

CO3: Acquire knowledge of biomolecular properties and their utilization in conducting various studies. (Applying)

CO4: Develop the ability to pursue research in any field, recognizing that biomolecules serve as the foundation of all scientific investigations. (Applying)

CO5: Apply analytical techniques to study and analyze biological molecules, enhancing the understanding of their structure, function, and interactions. (Analyzing)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (Biochemistry Major)

Course Name: Biochemical Technique (Minor)

Course Code: S2-BCH2T

Course Outcomes: -

CO1: Understand the significance of biological molecules and their crucial role in maintaining life processes. (Understanding)

CO2: Gain enthusiasm and knowledge about the importance of DNA, RNA, vitamins, and lipids in biological systems. (Understanding)

CO3: Explore the intricate properties of biomolecules and their applications in conducting diverse scientific studies. (Applying)

CO4: Develop the foundation necessary to pursue research in any field, recognizing that biomolecules serve as the fundamental building blocks of scientific investigations. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (Biochemistry Major)

Course Name: Analytical Technique (Open Elective)

Course Code: S2-BCH3T

Course Outcomes: -

CO1: Understand essential laboratory techniques utilized in diverse laboratory settings. (Understanding)

CO2: Develop practical skills to work in laboratory and research and development (R&D) sections of various industries. (Applying)

CO3: Enhance technological skills through the course, fostering proficiency in utilizing advanced tools and techniques. (Applying)

CO4: Gain exposure to a range of techniques and their applications in the separation and characterization of diverse biological molecules. (Analyzing)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (2nd Year)

Course Name: Enzymology

Course Code: 201-I

Course Outcomes: -

CO1: Illustrate the classification and nomenclature of enzymes along with key concepts of enzyme system.

CO2: Use different approaches for isolation and purification of enzymes from various sources.

CO3: Illustrate different mechanism of catalysis involved in enzyme catalysed reactions.

CO4: Correlate the activity of enzymes with its kinetics involving various factors.

CO5: Develop employability skills based on industrial applications of enzymes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (2nd Year)

Course Name: Intermediary Metabolism

Course Code: 201-II

Course Outcomes: -

CO1: Connect the different metabolic pathway for carbohydrates for yielding energy in cell.

CO2: Illustrate the pathway for transport of electron in ETC.

CO3: Relate the need and process of oxidation of lipid and biosynthesis of fatty acid in living system.

CO4: Categorize amino acid on the basis of its metabolism.

CO5: Develop insight about metabolism of nucleotide and porphyrin.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (3rd Year)

Course Name: Molecular Biology

Course Code: 301-I

Course Outcomes: -

CO1: Relate the structural organization of DNA in the formation of nuclear material.

CO2: Categorize the basic steps involved in DNA replication in prokaryotes and eukaryotes, emphasizing the enzymes involved in different types of replications.

CO3: Connect the enzymes with the process involved in the formation of RNA from DNA in prokaryotes and eukaryotes.

CO4: Correlate role of genetic code in protein synthesis.

CO5: Illustrate the importance of regulation in gene expression for prokaryotes and eukaryotes.

CO6: Conclude the impact of different types of mutation along with its molecular basis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: B.Sc. (3rd Year)

Course Name: Nutritional, Clinical & Environmental Biochemistry

Course Code: 301-II

Course Outcomes: -

CO1: Understand importance of balanced diet and plan balanced diet for various groups.

CO2: Devise energy requirement on the basis of BMR, SDA and physical activity.

CO3: Develop employability skill in collection and preservation of biological fluid.

CO4: Criticize the functionality of organs on the basis of level of different plasma enzymes.

CO5: Connect the importance of pollution preventive measures in maintenance of sustainable environment.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (1st Sem.)

Course Name: Chemistry of Biomolecules

Course Code: BC-11

Course Outcomes: -

CO1: Understand the classification and importance of carbohydrates and categorize different types of carbohydrates on the basis of its structure and properties.

CO2: Connect the classification, structure, properties of amino acid with protein and also different levels of organizations in protein.

CO3: Correlate classification, structure, properties with importance of Lipids.

CO4: Relate the structure and components of nucleic acid with its properties.

CO5: Correlate the properties and functions of vitamins with their coenzyme activity and identify the mechanism of hormone action.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (1st Sem.)

Course Name: Analytical Biochemistry

Course Code: BC-12

Course Outcomes: -

CO1: Develop skills for preliminary isolation of biological material emphasizing the importance of PH.

CO2: Plan separation of biological material according to their shape, size and charge.

CO3: Devise the applications of different types of electrophoresis and centrifugation in separation of biological materials.

CO4: Evaluate the metabolic pathways in living system using radioactive compounds.

CO5: Conclude the level of purity in sample obtained after separation and purification by different spectroscopic techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (1st Sem.)

Course Name: Cell Biology

Course Code: BC-13

Course Outcomes: -

CO1: Understand the structure of cells and various models proposed for the organization of plasma membrane.

CO2: Illustrate different types of transport mechanism across the plasma membrane.

CO3: Categorize the structural and functional components of mitochondria and chloroplast.

CO4: Relate various subcellular organelles involved in synthesis and transport of protein within the cellular system.

CO5: Connect the structure and functions of cell organelles with their role in subcellular functions.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (1st Sem.)

Course Name: Biostatistics

Course Code: BC-14

Course Outcomes: -

CO1: Understand different methods for the collection of data and design various ways of representing it.

CO2: Evaluate measure of central tendency and dispersion.

CO3: Illustrate correlation and regression between two variables.

CO4: Judge probability and distribution of data collected.

CO5: Develop and design research study and evaluate inferential statistics from it.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (2nd Sem.)

Course Name: Physiology

Course Code: BC-21

Course Outcomes: -

CO1: Correlate various components of blood with their role and illustrate the process of blood coagulation.

CO2: Relate the mechanism of urine formation in kidney and its role in the maintenance of water and electrolyte balance.

CO3: Connect the process of gaseous exchange in tissues and lungs with adaptation in respiration at higher altitudes

CO4: Illustrate the components and processes involved in the contraction of muscles.

CO5: Relate the conduction of nerve impulse and neuromuscular junction.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (2nd Sem.)

Course Name: Microbial Biochemistry

Course Code: BC-22

Course Outcomes: -

CO1: Understand the classification and importance of microorganism as a model system in genetics.

CO2: Judge type of microorganism present in a sample on the basis of various characterisation test.

CO3: Acquainted with routine practices in microbiological work such as sterilization, microbial nutrition, culture media.

CO4: Understand various metabolic process going on in microorganisms such as respiration, fermentation, photosynthesis.

CO5: Develop entrepreneur skills using applications of microorganism in the food and dairy industry.

CO6: Connect different types of fermenters and fermentation processes and the role of microbes in the assay of biomolecules.

CO7: Categorize viruses on the basis of structure and properties.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (2nd Sem.)

Course Name: Nutritional Biochemistry

Course Code: BC-23

Course Outcomes: -

CO1: Evaluate energy requirement on the basis of BMR, SDA and physical activity.

CO2: Correlate the requirement and source of carbohydrate and fat with the health status.

CO3: Prioritize protein source in diet on the basis of its quality, biological value and digestibility coefficient.

CO4: Interpret the nutritional significance of vitamins, minerals and correlate their deficiency symptoms.

CO5: Plan balanced diet for various age groups and judge disorders related to nutrition.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (2nd Sem.)

Course Name: Genetics

Course Code: BC-24

Course Outcomes: -

CO1: Understand Mendel's fundamental law of inheritance and connect with linkage, recombination and crossing over.

CO2: Evaluate genetic mapping through two and three factor genetic cross.

CO3: Develop concept of recombination in bacteriophage, complementation test and its role in genetic mapping.

CO4: Plan transfer of genetic material in microorganisms involving transformation, conjugation and transduction.

CO5: Connect knowledge about different types of mutations, mutagens, transposable elements and DNA repair mechanisms.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (3rd Sem.)

Course Name: Enzymology

Course Code: BC-31

Course Outcomes: -

CO1: Illustrate the classification and nomenclature of enzymes along with different approaches for isolation and purification of enzymes from various sources.

CO2: Correlate the activity of enzymes with its kinetics involving various factors and understand the significance of kinetic constants, the catalytic rate constant and specificity constant.

CO3: Correlate the effect of inhibitor on the velocity of enzyme catalysed velocity.

CO4: Illustrate different mechanism of catalysis involved in enzyme catalysed reactions.

CO5: Prioritize the regulation of enzyme activity and allosteric modification with physiological significance.

CO6: Categorize suitable method for immobilization of different enzymes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (3rd Sem.)

Course Name: Metabolism I

Course Code: BC-32

Course Outcomes: -

CO1: Relate importance of free energy, oxidation-reduction reaction and high energy phosphate compounds in maintenance of biological system.

CO2: Illustrate the pathway for transport of electron in ETC.

CO3: Correlate the role of hormones in regulation of blood sugar by involving glucose metabolism pathway.

CO4: Connect the different metabolic pathway for carbohydrates for yielding energy in cell.

CO5: Relate the need and process of oxidation of lipid and biosynthesis of fatty acid in living system.

CO6: Analyse metabolic reaction for synthesis and degradation of phospholipid and glycolipid, metabolism of cholesterol and bile acids.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (3rd Sem.)

Course Name: Plant Biochemistry

Course Code: BC-33-A

Course Outcomes: -

CO1: Conglomerates biochemical and cellular aspects of photosynthesis in plants.

CO2: Correlate different cycle operating in plants for respiration viz C3, C4, Cam cycle with their environment.

CO3: Illustrate nitrogen metabolism involving Nitrogen fixation and mechanism of action of nitrogenase complex, Nitrate metabolism.

CO4: Devise process of ammonia assimilation, nitrification and denitrification, translocation of organic and inorganic substances

CO5: Develop insight about defence system in plants, structure and function of plant hormones, secondary metabolites of plants.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (3rd Sem.)

Course Name: Environmental Toxicology

Course Code: BC-33-B

Course Outcomes: -

CO1: Connect types of toxic substances, dose-response relationship and phase I and II reaction for detoxification.

CO2: Illustrate tissue and organ specificity of toxicity in correlation with food toxicology.

CO3: Criticize the use of pesticides, insecticide, herbicide in agriculture practices.

CO4: Compare the effects of various pollutants on the survival of living system.

CO5: Categorize the toxins released by natural and household products and their test for toxicity.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (3rd Sem.)

Course Name: Biotechnology

Course Code: BC-34-A

Course Outcomes: -

CO1: Illustrate the process of genetic engineering by studying restriction enzymes and using them in the construction of Genomic and cDNA libraries.

CO2: Plan genetic engineering using different types of vectors according to product required.

CO3: Prioritize blotting techniques for analysis of genome and molecular markers like RFLP, RAPD, AFLP.

CO4: Plan invitro replication of DNA using PCR followed by DNA sequencing.

CO5: Devise different transfection methods for animals and plants.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (3rd Sem.)

Course Name: Advanced Biochemistry

Course Code: BC-34-B

Course Outcomes: -

CO1: Illustrate the structural organization of DNA in formation of nuclear material.

CO2: Prioritize blotting techniques for analysis of genome and molecular markers like RFLP, RAPD, AFLP.

CO3: Connect cell signalling and the role of various signalling molecules in signal transduction.

CO4: Illustrate nitrogen metabolism involving Nitrogen fixation and mechanism of action of nitrogenase complex, Nitrate metabolism.

CO5: Diagnose various inborn errors of metabolism.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (3rd Sem.)

Course Name: Biochemical Techniques

Course Code: OE-BT

Course Outcomes: -

CO1: Develop skills for preliminary isolation of biological material emphasizing the importance of PH.

CO2: Plan separation of biological material according to their shape, size and charge.

CO3: Devise the applications of different types of electrophoresis and centrifugation in separation of biological materials.

CO4: Evaluate the metabolic pathways in living system using radioactive compounds.

CO5: Conclude the level of purity in sample obtained after separation and purification by different spectroscopic techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (4th Sem.)

Course Name: Molecular Biology

Course Code: BC-41

Course Outcomes: -

CO1: Illustrate the structural organization of DNA in formation of nuclear material.

CO2: Categorize the basic steps involved in DNA replication in prokaryotes and eukaryotes, emphasizing the enzymes involved in different types of replications.

CO3: Connect the enzymes with the process involved in the formation of RNA from DNA in prokaryotes and eukaryotes.

CO4: Connect the steps and enzymes involved in synthesis of protein, post translational processing

CO5: Illustrate the importance of regulation in gene expression for prokaryotes and eukaryotes.

CO6: Design drugs for various diseases based on inhibitors of replication, transcription and translation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (4th Sem.)

Course Name: Metabolism II

Course Code: BC-42

Course Outcomes: -

CO1: Illustrate digestion, absorption and metabolism of protein.

CO2: Correlate glucogenic, ketogenic amino acid with inborn errors of metabolism.

CO3: Categorize metabolism of sulphur containing, acidic, basic, branched chain and aromatic amino acid.

CO4: Connect metabolism of nucleic acid with inherited disorders of purine and pyrimidine metabolism

CO5: Value biological role of mineral, trace element and toxic effect of heavy metal.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (4th Sem.)

Course Name: Clinical Biochemistry

Course Code: BC-43

Course Outcomes: -

CO1: Correlate acid-base with water-electrolyte balance in the body.

CO2: Develop inferential knowledge about drug designing utilizing knowledge of chemistry and structure of various antibiotics.

CO3: Connect various disorders associated with carbohydrate and lipid metabolism.

CO4: Evaluate status of organs using various organ function test.

CO5: Criticize the functionality of organs on the basis of level of different plasma enzymes.

CO6: Correlate the causes and mechanism behind carcinogenesis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (4th Sem.)

Course Name: Immunology

Course Code: BC-44-A

Course Outcomes: -

CO1: Illustrate physiology of immune response involving cell and antibody mediated immunity.

CO2: Correlate the components of the immune system and their role in the immune responses

CO3: Connect the role of structure of MHC molecules in the transplantation of the various organs and graft rejection.

CO4: Criticize the abnormal manifestations of the immune response and role of complement system in immunity.

CO5: Plan immunological studies using immunological techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Programme Name: M.Sc. (4th Sem.)

Course Name: Immunology

Course Code: BC-44-B

Course Outcomes: -

CO1: Understand various atmospheric constituents and correlate quality of soil with environmental component.

CO2: Correlate water chemistry with global water balance.

CO3: Illustrate the fundamentals of ecology including food chain, energy flow in ecosystem.

CO4: Relate biomes with various habitat diversity.

CO5: Connect various global environmental issues with international laws.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (Bioinformatics Major)

Course Name: Cell and Molecular Biology (Major)

Course Code: S1-BINFO1T

Course Outcomes: -

CO1: Recall the names and basic functions of cell organelles. (Remembering)

CO2: Compare the structure, properties, and functions of carbohydrates, lipids, proteins, and nucleic acids9 Understanding)

CO3: Apply knowledge of biomolecules to analyze their interactions within cells. (Applying)

CO4: Evaluate the impact of disruptions in the cell cycle on cellular health and disease. (Evaluating)

CO5: Apply knowledge of mutations to analyze and predict their effects on phenotypic outcomes. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (Bioinformatics Major)

Course Name: Bioinformatics (Minor)

Course Code: S1-BINFO2T

Course Outcomes: -

CO1. Recall the fundamental concepts of cell and molecular biology, such as cell structure, DNA structure, and basic gene expression processes. (Remembering):

CO2. Explain the process of cell division, including mitosis and meiosis. Understand the regulation of the cell cycle and the checkpoints that ensure proper cell division Understanding):

CO3. Apply knowledge of biochemical, molecular, and physiological aspects of cells and their behavior and organization. (Applying)

.**CO4**. Recall the fundamental biochemical and molecular processes that occur in cells, such as metabolism and cellular signaling. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (Bioinformatics Major)

Course Name: General Introduction to Bioinformatics (Open Elective)

Course Code: S1-BINFO3T

Course Outcomes: -

CO1. Understand the significance of biological molecules and their crucial role in maintaining life processes. (Understanding)

CO2. Gain enthusiasm and knowledge about the importance of DNA, RNA, vitamins, and lipids in biological systems. (Understanding)

CO3. Explore the intricate properties of biomolecules and their applications in conducting diverse scientific studies. (Applying)

CO4. Develop the foundation necessary to pursue research in any field, recognizing that biomolecules serve as the fundamental building blocks of scientific investigations. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (Bioinformatics Major)

Course Name: General Introduction to Bioinformatics (Major)

Course Code: S2-BINFO1T

Course Outcomes: -

CO1. Recall the basic principles and terminology related to bioinformatics. (Remembering)

CO2. Analyze and evaluate biological databases in the context of bioinformatics research. (Evaluating)

CO3. Apply data retrieval methods to obtain information from biological databases. (Applying)

CO4. Utilize sequence analysis techniques to analyze genetic sequences and draw meaningful conclusions. (Analyzing)

CO5. Understand the significance and functionality of structural databases in bioinformatics and assess their role in studying protein structures. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (Bioinformatics Major)

Course Name: General Introduction to Bioinformatics (Minor)

Course Code: S2-BINFO2T

Course Outcomes: -

CO1. Acquire knowledge about the different types of biological databases and their applications in life sciences. (Remembering)

CO2. Examine and explore sequence alignments and data retrieval systems used in bioinformatics research. (Understanding)

CO3. Demonstrate knowledge and proficiency in data retrieval methods and sequence analysis techniques in bioinformatics. (Applying)

CO4. Analyze and interpret data using phylogenetic analysis and comparative genome analysis methods in life sciences research. (Analyzing)

CO5. Apply acquired skills and knowledge as a lab assistant or technical assistant in an R&D project in life sciences. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (Bioinformatics Major)

Course Name: General Introduction to Bioinformatics

(Open Elective)

Course Code: S2-BINFO3T

Course Outcomes: -

CO1: Recall the fundamental concepts and information regarding biological databases. (Remembering)

CO2: Examine and comprehend sequence alignments and data retrieval systems, understanding their significance in bioinformatics research. (Understanding)

CO3: Understand the data retrieval methods and sequence analysis techniques to effectively retrieve and analyze biological data. (Understanding)

CO4: understand to synthesize information to conduct phylogenetic analysis and comparative genome analysis. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (2nd Year)

Course Name: Introductions to Computer & Programming

Course Code: 202-I

Course Outcomes: -

CO1: Knowledge about the computer and type of computer system.

CO2: Idea about computer hardware which helpsto make profession.

CO3: Describe operating system. Its installation and package related information student can pursue as a professional so.

CO4: Explain Data presentation, Programming and application designing.

CO5: Summrized the essential components of multimedia.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (2nd Year)

Course Name: Structural Bioinformatics

Course Code: 202-II

Course Outcomes: -

CO1: Understand the basics of Macromolecular structural properties.

CO2: Collect knowledge about the biological interaction.

CO3: Analyzed biophysical techniques and experimental methods also gives an opportunity of job and research and lab practices.

CO4: Relate innovative technology of Proteomics and genomics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (3rd Year)

Course Name: Biostatistics

Course Code: 302-I

Course Outcomes: -

CO1: Explain the basics of Biostatics and its important variable.

CO2: Describe the data collection, Interpretation and the representation of data in large scale very efficiently.

CO3: Idea of retrieval of statistical output from the big data.

CO4: Relate statistical inference of the Research hypothesis with the correlation and the regression concept.

CO5: Conclude Hypothesis testing is a job-oriented field for the ward.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Programme Name: B.Sc. (3rd Year)

Course Name: Mathematics for Biological Sciences

Course Code: 302-II

Course Outcomes: -

CO1: Knowledge of Series and logarithmic numerical data which is useful for competitive exams.

CO2: Explain the logical interpretation of structural dimension.

CO3: Understanding about Calculus.

CO4: Evaluate numerical computation is a major area of machine learning methodology.

CO5: Trigonometry and analytical Geometry is essential for geological studies and geographical studies.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (Biotechnology Major)

Course Name: Cell Biology and Biochemistry (Major)

Course Code: S1-BTECH1T

Course Outcomes: -

CO1: Explain the fundamental concepts and principles of cell biology, including cell structure, function, and organization. (Remembering)

CO2: Apply knowledge of chemical bonding and spatial arrangements of molecules to understand their role in the proper functioning and stability of biological systems. (Applying)

CO3: Describe the physical and chemical properties of various biomolecules, such as proteins, carbohydrates, lipids, and nucleic acids, and their significance in biological processes. (Understanding)

CO4: Analyze the impact of changes in biomolecule levels and their clinical significance, and understand the potential career opportunities in biochemical testing. (Analyzing)

CO5: Apply knowledge of medical laboratory techniques and their applications to understand the career opportunities in hospitals and pathological laboratories. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (Biotechnology Major)

Course Name: Microbiology and Immunology (Minor)

Course Code: S1-BTECH2T

Course Outcomes: -

CO1. Recall and describe the concept of microbial diversity, including different types of microorganisms and their nutritional requirements. (Understanding)

CO2. Understand the immune system, its properties, and types.. (Understanding)

CO3. Explain the properties and types of the immune system, including innate and adaptive immunity, and their role in defending against pathogens... (Understanding)

.**CO4**. Recall and identify the components and functions of the immune system. (Remembering)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (Biotechnology Major)

Course Name: Immunology (Open Elective)

Course Code: S1-BTECH3T

Course Outcomes: -

CO1. Recall and identify different types of microorganisms and their characteristics. (Remembering)

CO2. Recall the basic concepts of microbial nutrition and nutrient requirements. (Remembering)

CO3. Explain the diversity of microorganisms, including bacteria, viruses, fungi, and protozoa, and their roles in various ecosystems. (Understanding)

CO4. Explain the properties of the immune system, including specificity, memory, and self-recognition. (understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (Biotechnology Major)

Course Name: Microbiology and Immunology (Major)

Course Code: S2-BTECH1T

Course Outcomes: -

CO1. Recall and identify different types of microorganisms and their characteristics. (Remembering)

CO2. Explain the properties of the immune system, including specificity, memory, and self-recognition. (Understanding)

CO3. Apply knowledge of immunoglobulin structure and functions to analyze and predict antibody-antigen interactions in various immunological contexts. (Applying)

CO4. Analyze and interpret immunological data generated from various techniques to draw conclusions and make inferences about immune responses (Analyzing)

CO5. Critically evaluate the experimental design and methodology of immunological studies. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (Biotechnology Major)

Course Name: Cell Biology and Biochemistry (Minor)

Course Code: S2-BTECH2T

Course Outcomes: -

CO1. Recall the concept of molecular geometry and its influence on molecule interactions. (Remembering)

CO2. Understand the significance of different types of chemical bonds in maintaining molecular stability and interactions. (Understanding)

CO3. Comprehend the role of biomolecules in cellular processes and their importance in maintaining homeostasis. (Understanding)

CO4 Understand the range of career opportunities available in hospitals, pathological laboratories, and research institutions related to medical laboratory techniques and biochemical testing. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (Biotechnology Major)

Course Name: Microbiology –Theory (Open Elective)

Course Code: S2-BTECH3T

Course Outcomes: -

CO1: Recall the different types of microorganisms, such as bacteria, viruses, fungi, and protozoa. (Remembering)

CO2: Recall the prominent scientists and their discoveries in the field of Microbiology. (Remembering)

CO3: Demonstrate understanding of different methods and techniques used for microbial identification. (Understanding)

CO4: Explain the principles behind the various techniques used for counting bacterial colonies. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (2nd Year)

Course Name: Biophysics and Biochemistry

Course Code: 203-I

Course Outcomes: -

CO1: To understand the fundamentals knowledge of bioenergetics.

CO2: To know various Biophysical methods and their applications.

CO3: To apply the knowledge and Basic concept of biochemistry and to understand different Concept of pH, acid, base and buffer.

CO4: To know the Classification and properties of various biomolecules like-carbohydrate, lipids, proteins, amino acids and nucleic acids.

CO5: To understand the mechanism of enzyme catalysis and enzyme regulation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (2nd Year)

Course Name: Bioinstrumentation, Biostatistics and bioinformatics

Course Code: 203-II

Course Outcomes: -

CO1: To Understand the knowledge of Microscopy and Techniques of separation of biomolecules.

CO2: To Understand Chromatography and electrophoresis techniques.

CO3: To know the principle of spectrophotometry and colorimetry.

CO4: To apply the concept of Biostatistics in the field of biology.

CO5: To know the basics of Computer and Basic Bioinformatics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (3rd Year)

Course Name: Molecular Biology and Genetic Engineering

Course Code: 303-I

Course Outcomes: -

CO1: To understand the genome organization and DNA kinetics.

CO2: To know the concept of DNA, it's structure.

CO3: To gain the knowledge of prokaryotic and eukaryotic transcription and their regulation.

CO4: To know the concept of Post Transcriptional modification and translation.

CO5: To know the various types of mutations and their mechanism.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: B.Sc. (3rd Year)

Course Name: Applied Biotechnology

Course Code: 303-II

Course Outcomes: -

CO1: To know the knowledge of Microbial contamination & Spoilage.

CO2: To apply the knowledge of plant tissue culture technique.

CO3: To understand the Immunity, Immunoglobulin's and to understand animal culture technology.

CO4: To understand of Fermentation technology and its types.

CO5: To gain the knowledge of Environment and Environmental Biotechnology

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (I Sem.)

Course Name: Biochemistry

Course Code: BT-11

Course Outcomes: -

CO1: Describe Classification, structure and properties of amino acids and proteins.

CO2: Explain Mechanism of enzyme catalysis, enzyme kinetics and enzyme regulation.

CO3: Recognize Classification, structure and properties of carbohydrates and lipids.

CO4: Define Structure of cell membrane and its various functions.

CO5: Illustrate biological systems as well as role of biomolecules in metabolic pathways.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (I Sem.)

Course Name: Cell & Developmental Biology

Course Code: BT-12

Course Outcomes: -

CO1: Knowledge about microscopy and membrane structure and its function.

CO2: Tell basics concept of cell organelles and their origin and evolution.

CO3: Relate membrane system and their motility.

CO4: Idea about cell cycle and development of drosophila.

CO5: Compare plant Meristem organization and Differentiation of specialized cells.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (I Sem.)

Course Name: Microbiology

Course Code: BT-13

Course Outcomes: -

CO1: Identify Classification of microorganism and their structure.

CO2: Analysis Various media and culturing techniques.

CO3: Evaluate Microbial growth, its types, parameters and factors affecting.

CO4: Describe Mechanism of pathogenesis and mode of action of toxins.

CO5: Categorize Virology and mycology.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (I Sem.)

Course Name: Biostatistics & Bioinformatics

Course Code: BT-14

Course Outcomes: -

CO1: Apply biological data for statistical analysis and some major output from the biological big data.

CO2: Take Apart research-oriented branch for the students.

CO3: Knowledge about the computational data management and data organization.

CO4: Evaluate & management of biological database.

CO5: Understand concepts of machine learning and use techniques like phylogenetics construction.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (II Sem.)

Course Name: Molecular Biology

Course Code: BT-21

Course Outcomes: -

CO1: Idea of genome organization and DNA kinetics.

CO2: Teach concept of DNA, its structure, Replication and recombination.

CO3: Describe Prokaryotic and eukaryotic transcription and their regulation

CO4: Relate with Post Transcriptional modification and translation CO5: Explain Various types of mutations and their mechanism.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (II Sem.)

Course Name: Bacterial Genetics and Genetic Engineering

Course Code: BT-22

Course Outcomes: -

CO1: Understanding Bacterial recombination, Gene mapping and transposable genetic elements.

CO2: Knowledge Structure, function and types of bacteriophage and plasmid. CO3: Idea Basic concepts in genetic engineering and recombinant DNA technology.

C04: Summarized Various types of vectors and their properties.

CO5: Conclude Versatile tools and techniques used in genetic engineering and their applications.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (II Sem.)

Course Name: Immunology

Course Code: BT-23

Course Outcomes: -

CO1: Analysis Design a model of Immunoglobulins, describe which cell types and organs present in the immune response.

CO2: Illustrate various mechanisms that regulate immune responses and maintain tolerance.

CO3: Explain Exemplify the adverse effect of immune system including Allergy, hypersensitivity and autoimmunity.

CO4: Apply basic techniques for identifying antigen-antibody interactions.

CO5: Describe the immunological response against tumor and blood transfusion, Elucidate the reasons for immunization and aware of different vaccination

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (II Sem.)

Course Name: Analytical Technique

Course Code: BT-24

Course Outcomes: -

CO1: Knowledge about Biophysical Techniques its applications and instrumentation.

CO2: Idea about Chromatography Techniques & Electrophoresis techniques with all detail knowledge about its applications and instrumentation.

CO3: Understanding Centrifugation and its types with all detail knowledge about its applications and instrumentation.

CO4: Apply the basics concept of Radioactivity and its applications.

CO5: Relate with Protein structure prediction techniques crystallization, MADI-TOF and Mass spectrometry.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (III Sem.)

Course Name: Enzyme Technology

Course Code: BT-31

Course Outcomes: -

CO1: To understand the basics of enzymology and various techniques of enzyme isolation and enzyme assay.

CO2: To know the mmechanism of Enzyme Action and Techniques of separation and purification of enzymes.

CO3: To gain the knowledge of Bioenergetics and their mechanism.

CO4: To utility of enzyme inhibition and to know the effect of various factors on enzyme activity.

CO5: To learn Isoenzymes, multienzyme complex and Biosensors.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (III Sem.)

Course Name: Plant Biotechnology

Course Code: BT-32

Course Outcomes: -

CO1: To understand the In-vitro plant culture technique. Callus culture, Embryo culture technique.

CO2: To apply the plant transformation method and techniques for gene transfer.
CO3: To know virus resistance, disease resistance plants and male sterility.

CO4: Utility of Plant secondary metabolites and antibodies, edible vaccine and technique to enhance their production.

CO5: To gain the knowledge of Molecular Marker and Aided-Breeding techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (III Sem.)

Course Name: Environmental Biotechnology

Course Code: BT-33-A

Course Outcomes: -

CO1: To knowledge of Environment concept and issues, Pollution, and method for measurement of pollution

CO2: To learn about Air and Water pollution and its control through Biotechnology.

CO3: To gain knowledge of treatment schemes for waste water of dairy, distillery, sugar and antibiotic industries.

CO4: Uses of microbes in the treatment of Environment.

CO5: To idea about Bioremediation, Bio pesticides & Global environmental problems.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (III Sem.)

Course Name: Stem Cell Biology

Course Code: BT-33-B

Course Outcomes: -

CO1: To understand the basics of Stem Cell Biology and its applications.

CO2: To create the knowledge of Stem Cell characterization and application of stem cell.

CO3: To know the basics knowledge of treatment for human stem cell research. CO4: To gain knowledge of Stem cell-based therapies and Preclinical regulatory consideration.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (III Sem.)

Course Name: Food Biotechnology

Course Code: BT-34-A

Course Outcomes: -

CO1: To knowledge of Food Processing and nutritive value of food.

CO2: To idea about concept of Food Preservation and food processing Technologies.

CO3: To understand about types of Food Spoilage & Food Borne Diseases.

CO4: To create knowledge about Fermented Food Products and their advantages.

CO5: To idea about Microbial analysis of food, Quality Control.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (III Sem.)

Course Name: Pharmacogenomics

Course Code: BT-34-B

Course Outcomes: -

CO1: To get knowledge of Pharmacogenomics and its application.

CO2: To idea about concept of Pharmacology, Drug and drug response in patients.
CO3: To understand the various Genetic biomarkers and its uses in Pharmacogenomics.

CO4: To create knowledge about Techniques in pharmacogenomics and Qualitative testing.

CO5: To idea about Microbial analysis of food, Quality Control.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (III Sem.)

Course Name: Basic of Bioinformatics

Course Code: OE-BB

Course Outcomes: -

CO1: To knowledge of biological data bases and its applications.

CO2: To idea about concept of sequence alignment and their algorithms.

CO3: To understand about structural bioinformatics tools and data bases.

CO4: To create knowledge about domain and phytogenic analysis.

CO5: To idea about system biology and pharmacology.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (IV Sem.)

Course Name: Bioprocess Technology

Course Code: BT-41

Course Outcomes: -

CO1: To learn about of Bioprocess Technology and industrially important microbes and screening and maintenance.

CO2: To create the knowledge about Upstream and Downstream processing and Purification by chromatographic techniques.

CO3: To idea about types of fermentation processes and Bioreactors designs and measurement parameters.

CO4: To know about Microbial Technology and primary and secondary metabolites.

CO5: To learn idea about Industrial production and uses of microbes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (IV Sem.)

Course Name: Animal Biotechnology

Course Code: BT-42

Course Outcomes: -

CO1: To learn about animal tissue culture techniques and uses of different media used.

CO2: To know Basic techniques of mammalian cell culture in vitro and maintenance of culture.

CO3: To understand the roles of bioreactors in large scale production.

CO4: To gain the basic knowledge of tissue engineering and apoptosis.

CO5: To apply the concept of cell culture in production of biopharmaceuticals, Cell culture-based vaccines and their mechanism.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (IV Sem.)

Course Name: Cancer Genetics

Course Code: BT-43-A

Course Outcomes: -

C01: To gain the knowledge of tumors characteristics and structural changes in cancer cell and mutation.

C02: To create concept of oncogenes and other genes like- Tumour Suppressor genes; DNA repair genes

C03: To create the knowledge about types of cancer and syndromes.

C04: To know about tumour progression and their proliferation.

C05: To gain idea about carcinogenesis and gene therapy

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (IV Sem.)

Course Name: Bio nanotechnology

Course Code: BT-43-B

Course Outcomes: -

C01: To gain the knowledge of Nanotechnology and applications of Nanotechnology in Biology

C02: To create the knowledge of Spectroscopic techniques – UV – Visible Spectroscopy, Raman Spectroscopy, X - ray diffraction.

C03: To create concept of microscopic techniques – Confocal microscopy, Electron microscopy, Scanning probe microscopy.

C04: To know about Nanoparticles and their synthesis and Biodegradable polymers and their uses.

C05: To gain idea about Nanobiology, Nanosensers, Nanomedicine, Drug delivery system, Nano machine, Nano biosensors, Nano DNA Technology.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (IV Sem.)

Course Name: Genomics, Proteomics, IPR &Biosafety

Course Code: BT-44-A

Course Outcomes: -

C01: To understand the DNA sequencing method and principle.

C02: To enhance the knowledge about the different tools for genome analysis and techniques and Gene silencing techniques.

C03: To create idea about the different proteomic analysis methods and peptide microarray-based technology

C04: To understand job-oriented field such as patent, trademark and copyright designing for the industries.

C05: To learn about Biosaftey and Roles of Institutional Biosfety Committee for GMO applications in food and agriculture.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Programme Name: M.Sc. (IV Sem.)

Course Name: Engineering Principles/Project

Course Code: BT-44-B

Course Outcomes: -

C01: To understand the Engineering calculations, SI units and Mechanisms of boiling; film and nucleate boiling.

C02: To enhance the knowledge about the Fluid flow and mixing and Mechanism of mixing, scale up of mixing systems.

C03: To create idea about the Material balances and Energy, Basic energy concepts Intensive and extensive properties.

C04: To understand Heat transfer, Heat transfer equipment and mechanisms of heat transfer.

C05: To learn about Molecular diffusion, diffusion theory and Filtration filter aids, filtration equipment.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (Botany Major)

Course Name: Applied Botany (Major)

Course Code: S1- BOT1T

Course Outcomes: -

CO1: Understand the significance and role of Botany in the study of plants and their importance in various fields. (Remembering)

CO2: Acquire knowledge and comprehension of the basic aspects of applied Botany, including plant anatomy, physiology, ecology, and taxonomy. (L Understanding)

CO3: Evaluate and assess the employment opportunities available in the field of Botany, including careers in research, agriculture, conservation, and pharmaceuticals. (Applying)

CO4 Develop a comprehensive understanding of best health practices related to plants, including the use of medicinal plants, nutritional value of plants, and the importance of plant-based diets for human well-being. (Evaluating)

CO5: Explain settlement origin, classification, hierarchy, morphology, distribution, and associated problems. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (Botany Major)

Course Name: Basic Botany (Minor)

Course Code: S1- BOT 2T

Course Outcomes: -

CO1. Understand the diversity of plants and their evolutionary processes in the plant kingdom, including the classification and characteristics of different plant groups. (Remembering)

CO2. Explain the adaptation of plants from aquatic environments to colonizing terrestrial habitats, including the anatomical, morphological, and physiological changes that enable this transition. (Understanding)

CO3. Analyze the morphological, anatomical, and reproductive structures that drive plant evolution and investigate how these adaptations contribute to the survival and reproduction of plants. (Understanding)

CO4. Recognize the economic importance and significance of plants in nature, including their roles in food production, medicine, ecosystem services, and environmental conservation. (Understanding)

CO5. Familiarize themselves with locally prevalent microbial diseases affecting both plants and humans, understanding their impact on plant health and potential implications for human health. (Level 2 - Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (Botany Major)

Course Name : Basic Botany (Open Elective)

Course Code: S1- BOT 3T

Course Outcomes: -

CO1 Understand the diversity of plants and their evolutionary processes in the plant kingdom, including the factors that have contributed to their evolution and adaptation. (Remembering)

CO2 Explain the adaptation of plants from aquatic conditions to terrestrial habitats, including the challenges they faced and the specialized features and strategies they developed. (Understanding)

CO3. Investigate the changes in morphological, anatomical, and reproductive structures that have driven plant evolution, and understand their significance in terms of survival, reproduction, and ecological interactions. (Understanding)

CO4 Recognize and appreciate the economic importance of plants in nature, including their roles in food production, medicine, ecosystem functioning, and environmental sustainability. (Understanding)

CO5 Develop familiarity with the prevalent microbial diseases affecting plants and humans in local contexts, including their causes, impacts, and potential strategies for prevention and management. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (Botany Major)

Course Name: Basic Botany (Major)

Course Code: S2- BOT 1T

Course Outcomes: -

CO1. Understand the diversity of plants and their evolutionary processes in the plant kingdom, demonstrating knowledge of different plant groups and their evolutionary relationships. (Understanding)

CO2. Explain the process of plant adaptation from aquatic conditions to terrestrial habitats, recognizing the key anatomical, morphological, and physiological changes involved. (Understanding)

CO3 Investigate the morphological, anatomical, and reproductive structures that drive plant evolution, analyzing how these structures have changed over time. (Analyzing)

CO4. Recognize the economic importance and significance of plants in nature, identifying their roles in ecosystems, agriculture, medicine, and other aspects of human life. (Remembering)

CO5 Identify and understand locally prevalent microbial diseases affecting both plants and humans, demonstrating knowledge of their causes, symptoms, and preventive measures. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (Botany Major)

Course Name: Applied Botany (Minor)

Course Code: S2- BOT 2T

Course Outcomes: -

CO1. Recognize and explain the importance and role of Botany in various disciplines and industries. (Remembering)

CO2 Acquire knowledge of the fundamental concepts and principles in applied Botany, including plant anatomy, physiology, and taxonomy. (Applying)

CO3. Explore and gain awareness of the diverse employment opportunities available in the field of Botany, such as research, conservation, agriculture, pharmaceuticals, and horticulture. (Applying)

CO4. Discover the potential for engaging in social services through Botany, including activities related to community gardens, environmental education, sustainability initiatives, and public awareness campaigns. (Applying)

CO5. Develop an understanding of the importance of plants for human health and well-being, including the benefits of plant-based diets, herbal medicine, and the role of plants in promoting a healthy environment. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (Botany Major)

Course Name: Functional Botany (Open Elective)

Course Code: S2- BOT3T

Course Outcomes: -

CO1: Understand the significance and importance of Botany in various contexts, including its role in plant science, ecosystems, and human well-being (Remembering)

CO2: Acquire basic knowledge and understanding of functional Botany, including plant structure, growth, reproduction, and physiological processes. (Understanding)

CO3: Gain awareness of startup opportunities within the field of Botany, such as entrepreneurship in plant biotechnology, botanical products, or sustainable agriculture. (Understanding)

CO4: Understand the potential for engaging in social services through Botany, including activities related to environmental conservation, community gardens, and education about plant-based solutions. (Understanding)

CO5 Develop knowledge and understanding of best health practices through the study of Botany, including the benefits of plant-based diets, herbal remedies, and environmental factors that contribute to well-being. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (2nd Year)

Course Name: Taxonomy & Embryology of Angiosperms

Course Code: 204-I

Course Outcomes: -

CO1: Discover the conceptual development of taxonomy and classification of angiosperms.

CO2: Understand the characteristics of biologically important families of angiosperms.

CO3: Relate the floral variations in angiospermic families, their phylogeny and evolution.

CO4: Interpret Microsporogenesis, Megasporogenesis and Pollination to correlate their importance. CO5: Write about fertilization and formation of fruits, seeds and their role.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (2nd Year)

Course Name: Plant Ecology Biodiversity and Phytogeography

Course Code: 204-II

Course Outcomes: -

CO1: Develop knowledge about the Ecosystem and biogeochemical cycles and how it works in the environment.

CO2: Articulate plant communities and ecological adaptations in plants.

CO3: Illustrate about biodiversity and national parks for conservation of nature.
CO4: Categorize soil profile and environmental pollution.

CO5: Prioritize Phytogeography regions of India and distribution of plants.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (3rd Year)

Course Name: Plant Physiology and Biochemistry

Course Code: 304-I

Course Outcomes: -

CO1: Collaborate plant –water relationship.

CO2: Develop understanding about Mineral nutrition and biomolecules in plants.

CO3: Evaluate the mechanism of Photosynthesis in plants.

CO4: Pivot about mechanism of Respiration in plants.

CO5: Value about naturally occurring enzymes and plant hormones

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (3rd Year)

Course Name: Plant Physiology and Biochemistry

Course Code: 304-I

Course Outcomes: -

CO1: Collaborate plant –water relationship.

CO2: Develop understanding about Mineral nutrition and biomolecules in plants.

CO3: Evaluate the mechanism of Photosynthesis in plants.

CO4: Pivot about mechanism of Respiration in plants.

CO5: Value about naturally occurring enzymes and plant hormones.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: B.Sc. (3rd Year)

Course Name: Plant Physiology and Biochemistry

Course Code: 304-II

Course Outcomes: -

CO1: Evaluate about cell structure and cell organelles in easy manner.

CO2: Correlate about chromosomal organization, DNA and replication in prokaryotes.

CO3: Analyze about the genetic inheritance and technologies related to improvement of genetic species.

CO4: Develop understanding about Structure and role of gene and different molecules in protein synthesis. CO5: Use the principles of and applications of Biotechnology, plant tissue culture and genetic engineering.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (1st Sem.)

Course Name: Biology & Diversity of Viruses, Bacteria and Fungi

Course Code: BO-11

Course Outcomes: -

CO1: Interpret microbial world.

CO2: Sketch the morphology, reproduction and life cycle patterns of Bacteria, Fungi and Cyanobacteria.

CO3: Correlate infection cycle of microbes and fungi and their control measures.

CO4: Cite the collection of fungi, Bacteria, and Cyanobacteria from different localities.

CO5: Design the method to utilize fungi as an industrial tool.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (1st Sem.)

Course Name: Biology & Diversity of Algae & Bryophytes

Course Code: BO-12

Course Outcomes: -

CO1: Compare the general characteristics of algae & bryophyte and their diversified habitat.

CO2: Categorize different algae for human welfare

CO3: Illustrate life cycle of Chlorophyta, Xanthophyta, & Phaeophyta.

CO4: Interpret Rhodophyta and their practical application.

CO5: Illustrate the life cycle of Bryophytes

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (1st Sem.)

Course Name: Biology & Diversity of Pteridophytes & Gymnosperms

Course Code: BO-13

Course Outcomes: -

CO1: Classify, interpret and summarize the history of Pteridophytes.

CO2: Illustrate the role of Pteridophytes in plant kingdom.

CO3: Value economic importance of Gymnosperms.

CO4: Interpret the role of order Pentoxylales, Ginkgoales.

CO5: Illustrate & correlate Gnetales with Angiosperms.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (1st Sem.)

Course Name: - Plant Ecology

Course Code: BO-14

Course Outcomes: -

CO1: Discover the concept of ecosystem and role of Biodiversity conservation. CO2: Modify their knowledge of mineral cycling in ecosystem and can understand its value.

CO3: Correlate ecological succession with Biodiversity.

CO4: Collaborate concept of community.

CO5: Value their role in population dynamic study

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IInd Sem.)

Course Name: - Plant Development & Reproduction

Course Code: BO-21

Course Outcomes: -

CO1: Interpret the meristematic development in plants.

CO2: Illustrate the account of primary and secondary anomalies.

CO3: Apply the ABC model of flower development and Microsporogenesis.

CO4: Value the importance of Megasporogenesis and illustrate account of embryo sac.

CO5: Correlate the endosperm with embryo development.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IInd Sem.)

Course Name: - Morphology & Taxonomy of Angiosperms

Course Code: BO-22

Course Outcomes: -

CO1: Interpret the concepts of floral morphology.

CO2: Categorize modern trends in Taxonomy

CO3: Analyze the diagnostic characters of major orders and families of Angiosperms.

CO4: Write about artificial key for plants

CO5: Collaborate plant conservation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IInd Sem.)

Course Name: - Utilization & Conservation of Plant Resources

Course Code: BO-23

Course Outcomes: -

CO1: Understand about Natural Resources, their availability use and also about types of forest in the world.

CO2: Interpret the economic important of forest plants regarding their medicinal important and importance of non-wood forest products like Gum plant, Fodder plant etc.

CO3: Articulate different conservation practices for forest and natural resources and planned further for sustainable development.

CO4: Develop their career in forest services, plant produce marketing and aquatic habitat.

CO5: Evaluate the importance of air, water and soil pollution effect on ecosystem, climate changes and also criticize global warming and ozone layer depletion.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IInd Sem.)

Course Name: - Cell Biology

Course Code: BO-24

Course Outcomes: -

CO1: Illustrate the structure of plant cell.

CO2: Interpret the various models and functioning of plasma membrane.

CO3: Analyze about various cell organelles of plant cell'

CO4: Illustrate chromosome structure and cell cycle.

CO5: Conclude about breeding behavior in plants.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: - Plant Physiology

Course Code: BO-31

Course Outcomes:

CO1: Correlate Plant Physiology with different fields of plant processes.

CO2: Interpret Phloem transport, loading and unloading. Proteins, phospholipids signaling.

CO3: Understand the Plant growth regulator to pivot design and development of new methods.

CO4: Correlate Photoperiodism and Vernalization.

CO5: Connect stress physiology with environment.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: - Plant Biochemistry and Metabolism

Course Code: BO-32

Course Outcomes:

CO1: Analyze different bio chemical and metabolic functions of plants.

CO2: Correlate photosynthesis, photorespiration and its significance.

CO3: Illustrate respiration.

CO4: Categorize lipid and sulphate metabolism and evaluate function of lipids.

CO5: Devise Nitrogen metabolism.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: III - A Elective 1: Cytology and Genetics

Course Code: BO-33-A

Course Outcomes:

CO1: Interpret the structure of plant cell.

CO2: Classify various models and functions of plasma membrane.

CO3: Analyze various cell organelles of plant cell.

CO4: Illustrate chromosome structure and cell cycle.

CO5: Pivot Mendal's law of inheritance.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: - III-B Elective 1: Economic Botany

Course Code: BO-33-B

Course Outcomes:

CO1: Correlate global warming and climate change.

CO2: Appraise Indian medicinal plants and its uses.

CO3: Prioritize plants of economic importance including edible and forage.

CO4: Categorize plant products.

CO5: Develop organic farming and bio-fertilizers.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: - Molecular Biology

Course Code: BO-34-A

Course Outcomes:

CO1: Analyze DNA and RNA

CO2: Illustrate structure of genes.

CO3: Evaluate the process of Protein synthesis.

CO4: Categorize different Molecular techniques

CO5: Relate to use of Immuno-techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: - Advance-Taxonomy, Embryology and Anatomy of Angiosperms

Course Code: BO-34-B

Course Outcomes:

CO1: Reframe Modern systems of classification in the light of New Concepts of classification. CO2: Write the theories of evolution of Angiosperms.

CO3: Analyze Tissues and Tissues systems.

CO4: Illustrated account of Embryology and its prospects.

CO5: Evaluate polyembryony, embryo-culture, Seed and seed germination.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: - Environmental Biology

Course Code: BO-OE-EB

Course Outcomes:

CO1: Articulate concept and scope of environmental biology

CO2: Analyze Biogeochemical cycles.

CO3: Evaluate concept of population and population growth forms.

CO4: Design method to preserve Biodiversity.

CO5: Write and correlate details of different types of pollution.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Plant Cell, Tissue and Organ Culture

Course Code: BO- 41

Course Outcomes:

CO1: Describe Plant tissue culture, Introduction and scope.

CO2: Evaluate the process of somatic embryogenesis.

CO3: Write in detail about protoplast culture and Somatic hybridization.

CO4: Analyze about Somoclonal variation and role of tissue culture.

CO5: Articulate application of plant tissue culture in agriculture.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Biotechnology and Genetic Engineering

Course Code: BO- 42

Course Outcomes:

CO1: Understand about biotechnology and its tools and techniques.

CO2: Develop understanding of Genetic transfer, DNA finger printing and PCR.

CO3: Write about transgenic crops and ethical issues related to it.

CO4: Articulate the use of Biotechnology in development of economically important microbes.

CO5: Write basic concepts of Bioinformatics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Plant Pathology

Course Code: BO- 43-A

Course Outcomes:

CO1: Illustrate various disease-causing organisms on plants of economic importance and their control.

CO2: Develop concepts of disease control by studying the phenomenon of infection, virulence and defense in hosts.

CO3: Categorize some important plant diseases.

CO4: Develop disease resistance crops.

CO5: Modify the effect of pathogenesis on environment.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Plants & Society

Course Code: BO- 43-B

Course Outcomes:

CO1: Develop entrepreneurship.

CO2: Judge the possible uses of plants for livelihood of humans are included in this course.

CO3: Design jobs in the field of Pharma, cosmetic and paper industry.

CO4: Develop and design their own tissue culture lab, Bonsai Garden, mushroom cultivation unit.

CO5: Reframe alternate source of income through production of medicinal plants, horticulture and nursery management.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Industrial Microbiology

Course Code: BO- 44-A

Course Outcomes:

CO1: Pivot their technical and information skills through microscopy, staining culture techniques and information about nutrition and growth of microorganisms.

CO2: Appraise quality Food, their preservation and production.

CO3: Develop technical skills regarding selection of micro-organisms, quality control and gain knowledge about Production of antibiotics, steroids, vaccines and vitamins.

CO4: Connect microbial growth with environmental influences, physical, chemical and antibiotic controls.

CO5: Grade potable water quality and analyze importance of BOD.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Pollution Ecology

Course Code: BO- 44-B

Course Outcomes:

CO1: Prioritize the solutions and various environmental problems.

CO2: Categorize environmental problems of India with special reference to Madhya Pradesh. CO3: Relate sources of Air, Soil and Water Pollution and inculcate steps to reduce environment pollution.

CO4: Collaborate and value environmental laws.

CO5: Appraise NGO'S and pollution control boards in creating awareness about environmental problems and means to control them.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Applied Botany

Course Code: BO- 44-C

Course Outcomes:

CO1: Value about entrepreneurship and Govt. services

CO2: Judge the policies and various schemes and subsidies which helps in develop carrier.

CO3: Collaborate Cultivation and marketing of floriculture and nursery development.

CO4: Develop knowledge and information about organic farming, vermi-culture, green manure and bio fertilizer which help them in their future life.

CO5: Design their career in Cultivation medicinal plants.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (Chemistry Major)

Course Name: Fundamental of Chemistry (Major)

Course Code: S1-CHE1T

Course Outcomes: -

CO1: Recall and describe ancient Indian chemical techniques, evaluating their historical significance and impact on the development of chemical knowledge. (Remembering)

CO2: Explain various theories and principles applied to reveal the atomic structure,. (Understanding)

CO3: . Analyze the significance of quantum numbers in describing the energy levels, electron configurations, and spectroscopic properties of atoms. (Applying)

CO4: Evaluate and compare different concepts and theories related to the periodic properties of elements. (Analyzing)

CO5: Critically examine theories and models related to chemical bonding. Synthesize and integrate knowledge of acid-base concept. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (Chemistry Major)

Course Name: Analytical Chemistry (Minor)

Course Code: S1-CHE2T

Course Outcomes: -

CO1. Recall and describe the basic concepts of mathematics relevant to chemists. (Remembering)

CO2. Understand the fundamentals of analytical chemistry, including the principles and techniques involved in chemical analysis. (Understanding)

CO3. Gain basic knowledge of computer applications in chemistry, including data processing, chemical database searching, and numerical simulations. (Remembering)

CO4. Describe the principles of chromatography and various chromatographic techniques used in chemical analysis. (Understanding)

CO5. Understand the different techniques of spectroscopic analysis. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (Chemistry Major)

Course Name: Chemistry in Everyday Life (Open Elective)

Course Code: S1-CHE3T

Course Outcomes: -

CO1. Understand the chemistry of ancient India, including the construction materials used and significant discoveries in the field.(Remembering)

CO2. Acquire knowledge about acids, bases, and salts that play a role in our daily lives, recognizing their importance in various applications.(Understanding)

CO3. Gain an understanding of food adulteration, its detrimental effects on health, and methods to detect adulteration, as well as the essential constituents of our food.(Understanding)

CO4. Familiarize oneself with the chemical nomenclature of commonly used materials in daily life.(Understanding)

CO5. Develop a basic understanding of disinfectants, pesticides, and cleaners.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (Chemistry Major)

Course Name: Analytical Chemistry (Major)

Course Code: S2-CHE1T

Course Outcomes: -

CO1. Recall and describe the basic concepts of mathematics relevant to chemists, including arithmetic operations.(Remembering)

CO2. Explain the fundamental principles and steps involved in analytical chemistry. (Understanding)

CO3. Demonstrate proficiency in using computer applications for chemical tasks, such as data processing, chemical database searching.(Applying)

CO4. Analyze and interpret the concept of chemical equilibrium.(Analyzing)

CO5 Evaluate the principles and techniques of chromatography. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (Chemistry Major)

Course Name: Fundamental of Chemistry (Minor)

Course Code: S2-CHE2T

Course Outcomes: -

CO1. Recall and describe ancient Indian chemical techniques and their contributions to the field of chemistry.(Remembering)

CO2 Understand various theories and principles applied to reveal the atomic structure, including the Bohr model and quantum mechanical models.(Understanding)

CO3. Recognize the significance of quantum numbers in describing the energy levels and electron configurations of atoms.(Remembering)

CO4. Explain the concepts of periodic properties of elements, including atomic radius, ionization energy, and electronegativity.(Understanding)

CO5. Understand acid-base concepts, pH, and buffers, including the role of acids and bases in chemical reactions and their impact on pH .(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (Chemistry Major)

Course Name: General aspects of Chemistry

(Open Elective)

Course Code: S2-CHE3T

Course Outcomes: -

CO1: Understand the chemistry of ancient India, including the use of ancient medicines, dyes, and preservatives, and describe their significance in historical contexts.(Remembering)

CO2: Gain knowledge about water, its analysis, and treatment methods, as well as the laws and standards implemented to improve water quality.(Understanding)

CO3: Acquire an understanding of the environment, particularly in relation to air and soil, and recognize the significance of maintaining and improving environmental quality for human well-being.(Understanding)

CO4: Familiarize oneself with the basics of blood and the biological system, recognizing their importance in maintaining overall health, and understand how knowledge of these systems can contribute to personal well-being.(Remembering)

CO5: Develop an awareness of common diseases and their prevention, utilizing the knowledge gained from this unit to adopt preventive measures and promote personal health and well-being.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (2nd Year)

Course Name: Physical Chemistry

Course Code: 205-I

Course Outcomes: -

C01: The pivotal role played by thermal, electrical, chemical, mechanical energies in all universal phenomena.

C02: (i) Develop new alloys for metallurgists and material engineers.

(ii) Applicable to phase transfer of various materials.

(iii) Application of solvent extraction and chromatography.

C03: Application of electrochemistry in metallurgy.

C04: Industrial processes.

C05: Plan concepts for production of industrial products like paints, toothpaste, syrup etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (2nd Year)

Course Name: Inorganic Chemistry

Course Code: 205-II

Course Outcomes: -

C01: The pivotal role of transition metal in industry and its importance for the world economy.

C02: Correlate transition metals with pharmaceutical industry.

C03: Design co-ordination compounds and their application as catalyst in biological systems, metallurgy and medicines.

C04: Categorize 'f' block elements.

C05: The role play of non-aqueous solvents in research and industry.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (2nd Year)

Course Name: Organic Chemistry

Course Code: 205-III

Course Outcomes: -

C01: Appraise UV, IR spectroscopy and its pivotal role in the structure elucidation of organic compounds.

C02: Categorize preparation, properties of alcohols and phenols.

C03: Device methods of preparation, properties of aldehydes and ketones.

C04: Correlate preparation, properties of carboxylic acids.

C05: Categorize amino, nitro and azo compounds with their preparation and properties.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (3rd Year)

Course Name: Physical Chemistry

Course Code: 305 -I

Course Outcomes: -

C01: Correlate quantum mechanics with M.O. theory.

C02: Study interaction of microwave and IR radiations with matter.

C03: Explore chemical composition and structure of molecules.

C04: Acquaint with photochemical processes.

C05: Correlate optical activity and dipole moment with structure of molecules.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (3rd Year)

Course Name: Inorganic Chemistry

Course Code: 305 -II

Course Outcomes: -

C01: Reframe HSABs.

C02: Develop concept of metal ligand bonding and stability of complexes.

C03: Create concept of magnetic properties.

C04: Correlate electronic spectra with structure of complexes.

C05: a) Role play of essential and trace elements in biological systems.

b) Illustrate metal nitrosyl complexes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: B.Sc. (3rd Year)

Course Name: Organic Chemistry

Course Code: 305-III

Course Outcomes: -

C01: Interpret UV, IR and NMR spectra.

C02: Categorize organometallic compounds.

C03: Co-relate structure and properties of carbohydrates.

C04: Co-relate amino acids, protein and nucleic acids.

C05: Summarize heterocyclic compounds

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – I st SEMESTER

Course Name: Inorganic Chemistry - I

Course Code: CH-11

Course Outcomes: -

C01: Correlate trends in periodic properties and chemical bonding.

C02: Develop concept of stability of complex.

C03: Illustrate reaction mechanism of transition metal complexes.

C04: Categorize metal ligand bonding.

C05: Correlate acidic and basic behavior of substances

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – I st SEMESTER

Course Name: Organic Chemistry - I

Course Code: CH-12

Course Outcomes: -

C01: Correlate reactivity and chemical bonding and their pivotal role in organic compounds.

C02: Illustrate concept of stereochemistry.

C03: Correlate stability of different isomers with special reference to orientation.

C04: Reframe various reactions, mechanism and their applications.

C05: Categorize substitution, addition and elimination reactions.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – I st SEMESTER

Course Name: Physical Chemistry - I

Course Code: CH-13

Course Outcomes: -

C01: Apply concept of quantum mechanics.

C02: Value different principles and applications of variation and perturbation theory.

C03: Rewrite concept of angular momentum, Eigen functions, Eigen values and Pauli's exclusion principle and correlate structure and properties of molecules.

C04: Critical acclaim of concept of thermodynamics and its key role in the properties of the molecules.

C05: Illustrate distribution and thermodynamic probability for study of materials.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – I st SEMESTER

Course Name: Group Theory and Spectroscopy-I

Course Code: CH-14

Course Outcomes: -

C01: Analyze symmetry for structure elucidation of molecules.

C02: Study interaction of microwave radiation with matter and its applications.

C03: The pivotal role of IR spectroscopy in strucuture elucidation of compounds.

C04: Identify finger print region in Raman Spectroscopy to characterize chemical composition.

C05: Role play of electronic spectroscopy in detecting contamination in various samples.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IInd SEMESTER

Course Name: Inorganic Chemistry - II

Course Code: CH- 21

Course Outcomes:

C01: Correlate electronic spectra of metal complexes with their structure and properties.

C02: Categorize the magnetic properties of transition metal complexes.

C03: Illustrate preparation, properties and structure of metal carbonyls and nitrosyls.

C04: Design structure of metal clusters.

C05: Correlate optical properties of complexes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IInd SEMESTER

Course Name: Organic Chemistry – II

Course Code: CH- 22

Course Outcomes:

C01: Illustrate mechanistic aspects in nucleophilic and electrophilic substitution reactions.

C02: Rewrite free radical reactions and different name reactions.

C03: Correlate mechanistic and stereochemical aspects of addition reactions.

C04: Design mechanism of name reactions relating to addition to carbon carbon double bonds.

C05: Appraise pericyclic reactions pertaining to molecular orbitals, prediction of reaction mechanism and formation of products.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IInd SEMESTER

Course Name: Physical Chemistry - II

Course Code: CH- 23

Course Outcomes:

C01: Elucidate use of chemical kinetics for reaction mechanism.

C02: Estimate surface area by applying BET equation correlating shape and composition of micelle with surfactant and CMC.

C03: Summarize kinetics and mechanism of polymerization.

C04: Illustrate thermodynamics of natural processes and how to transfer energy in various irreversible thermodynamics processes.

C05: Interpretation of Debye- Huckel Ousagar Treatment and correlate structure of electrified interface and semiconductor solution interface.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IInd SEMESTER

Course Name: Spectroscopy II and Diffraction Methods

Course Code: CH- 24

Course Outcomes:

C01: Elucidate structure of organic compounds using NMR spectroscopy.

C02: Confirm biologically active systems and to recognize the electronic structure of molecules.

C03: Identify free radicals and collaborate with ESR spectroscopy.

C04: Interpret x-rays for fractures and further analysis of diseases.

C05: Illustrate crystal structure by electron diffraction and neutron diffraction.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Application of Spectroscopy – I

Course Code: CH - 31

Course Outcomes:

C01: Illustrate electronic spectra of transition metal complexes.

C02: Value role of vibrational spectroscopy in determining structure, bond length, force constant of the molecules.

C03: Appraise NMR spectroscopy for structure elucidation of organic compounds.

C04: Design application of NMR spectroscopy to differentiate crystalline and no crystalline compounds.

C05: Collaborate Mossbaur spectroscopy with physics, chemistry, biology, mineralogy and metallurgy.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Photochemistry

Course Code: CH - 32

Course Outcomes:

C01: Correlate theory and practice with photochemical and photophysical methods.

C02: Modify theoretical methods for treating excited states.

C03: Rewrite role play of photo induced processes in semi- conductors.

C04: Collaborate theory and application of photo catalysis.

C05: Write role play by singlet molecules oxygen in photochemical reactions in synthesis of biologically active compounds.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Environmental Chemistry

Course Code: CH - 33

Course Outcomes:

C01: Conclude the chemical and biochemical principles of fundamental environmental processes.

C02: Grade different types of toxic substances and collaborate toxicological information.

C03: Apply chemical concepts to conclude chemical processes involved in different environmental problems.

C04: Value water purification and waste treatment process. To prioritize cause and effects of environmental pollution.

C05: Defend energy crisis and different aspects of sustainability. Judging the local and global environmental issues.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Polymers Chemistry

Course Code: CH – 34-A

Course Outcomes:

C01: Categorize kinds of polymers and their applications in daily life.

C02: Categorize polymers by virtue of molecular weight distributions, polydispersity, ultracentrifugation methods. C03: Analysis and testing of polymers in the industry.

C04: Illustrate structure, properties and application of inorganic polymers.

C05: Role play of metal chelate polymers and co-ordination complexes in industries.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Natural Products

Course Code: CH – 34-B

Course Outcomes:

CO1: Classify terpenoids and caro ternoids.

CO2: Categorize alkaloids CO3: Distinguish steroids

CO4: Identify plant pigments

CO5: Detect prostaglandins, pyrethroids and rotenone's.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Organ transition Chemistry

Course Code: CH – 34-C

Course Outcomes:

C01: Role play of organo transition metal complexes in biological systems.

C02: Illustrate synthesis, structure, bonding and reactivity of organotransition metal complexes.

C03: Reframe organotransition metal complexes and bonds with hydrogen, boron and silicon.

C04: Sketching function of organo transition metal complexes in homogeneous catalysis.

C05: Correlate fluxionality and dynamic equilibrium and their pivotal role in η-2 olefins and dienyl complexes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Heterocyclic Chemistry

Course Code: CH – 34-D

Course Outcomes:

CO1: Differentiate aromatic heterocycles.

CO2: Contrast non aromatic heterocycles.

CO3: Co-relate small ring heterocycles.

CO4: Compile meso-ionic heterocycles and six membered heterocycles with one hetero atom.

CO5: Characterize sis membered heterocycles with two or more hetero atoms.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IIIrd SEMESTER

Course Name: Health Chemistry

Course Code: OE-HC

Course Outcomes:

C01: Modify dietary habits.

C02: Collaborate identification of drugs and drug designing in the research field.

C03: Judge health through study of blood chemistry.

C04: Develop knowledge of enzymes and hormones to maintain digestive health

C05: Create awareness to prevent common contagious, life style and food and water borne diseases.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: Application of Spectroscopy – II

Course Code: CH-41

Course Outcomes:

C01: Categorize UV visible spectroscopy for the quantitative determination of different analytes.

C02: Connect IR spectroscopy for structure elucidation of organic compounds.

C03: Illustrate chemical structure of organic molecules.

C04: Correlate NMR spectroscopy with molecular physics. C05: Evaluate mass to charge ratio as an application of mass spectroscopy.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: Solid State Chemistry

Course Code: CH-42

Course Outcomes:

C01: Correlate principles underlying solid state reactions with experimental procedures.

C02: Categorize crystals and their defects. C03: Correlate electronic properties of solids with band theory.

C04: Connect study of organic solid and super conductors to metals.

C05: Classify liquid crystal, types and applications.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: Biochemistry

Course Code: CH-43

Course Outcomes:

C01: Evaluate importance of trace metals, Na+ / K+ pump in biological systems.

C02: Correlate transport and storage of dioxygen with functions of Haemoglobin and Chlorophyll. C03: Study classification of enzymes and factors affecting enzyme action.

C04: Correlate coenzyme chemistry with enzyme models and applications.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: Analytical Chemistry

Course Code: CH-44- A

Course Outcomes:

C01: Reframe fundamentals of analytical chemistry and safety in laboratory.

C02: Develop study of contamination of food stuff and its analysis by chromatography.

C03: Analyze techniques of water pollution with types.

C04: Illustrate quality of fuel and soil by using different methods.

C05: Develop chemistry behind clinical tests, narcotic and dangerous drugs.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: Organic Synthesis

Course Code: CH-44- B

Course Outcomes:

CO1: Ascertain the disconnection approach.

CO2: Classify one group and two group C-C disconnections.

CO3: Differentiate organometallic reduction.

CO4: Enumerate organometallic reagents.

CO5: Application of synthesis of complex molecules.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: : Medicinal Chemistry

Course Code: CH-44- C

Course Outcomes:

C01: The role play of SAR in properties of different compounds.

C02: To develop study of enzymatic reaction and sulpha drug and its effect on human body.

C03: Correlate structure and synthesis of antibiotics and its effect on micro-organisms.

C04: Evaluate chemotherapeutic effect of antifungal and antimalarial drugs.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: Electrochemistry

Course Code: CH-44- D

Course Outcomes:

C01: Defend electrochemical energy storage.

C02: Determine corrosion and stability of metals C03: Explain bio electrochemistry

C04: Analyses methods of determining kinetic parameters for quasi reversible and irreversible waves. C05: Evaluate potential seep method and bulk electrolysis methods.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Programme Name: M.Sc. – IVth SEMESTER

Course Name: Cheminformatics

Course Code: CH-44- E

Course Outcomes:

C01: Design data base concepts

C02: Clarify basics of bio informatics.

C03: Organize cheminformatics tools.

C04: Outline drug design.

C05: Enumerate medical and pharmacy informatics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (Computer Science Major)

Course Name: Computer System Architecture (Major)

Course Code: S1-CSC1T

Course Outcomes: -

CO1: Recall and describe the components and basic functioning of a digital computer system. (Remembering)

CO2: Apply knowledge of combinational logic circuits to design and construct basic digital circuits, given specific parameters or requirements.. (Applying)

CO3: Analyze the operation and functionality of the arithmetic and logic unit (ALU) in a digital computer, and understand the concept and benefits of pipelining in improving instruction execution efficiency. (Analyzing)

CO4: Evaluate the advantages and trade-offs of cache memories and virtual memory in terms of memory hierarchy management and system performance.(Evaluating)

CO5: Create a comprehensive report or presentation highlighting the significant contributions of Indian researchers and professionals in the field of computer architecture and related technologies, showcasing their innovations and impact.(Creating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (Computer Science Major)

Course Name: Programming Methodologies and Data s (Minor)

Course Code: S1-CSC2T

Course Outcomes: -

CO1. Understand the principles of top-down design and its importance in developing structured and modular computer programs.. (Understanding)

CO2. Understand the characteristics of efficient and well-structured computer algorithms and programs. (Understanding)

CO3. Understand the concept of iteration in programming and its applications in solving problems.. (Understanding)

.**CO4**. Demonstrate knowledge of using pointers and implementing searching methods, such as linear search or binary search, in programming(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (Computer Science Major)

Course Name: Computer System Architrcture (Open Elective)

Course Code: S1-CSC3T

Course Outcomes: -

CO1: Understand the basic structure. operation and characteristics of digital computer.

CO2: Be able to design simple combinational digital circuits based on given parameters.

CO3: Familiarity with working of arithmetic and logic unit as well as the concept of pipelining.

CO4: Know about hierarchical memory system including cache memories and virtual memory.

CO5: Understand concept and advantages of parallelism. threading. multiprocessors and multicore processors

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (Computer Science Major)

Course Name: Multimedia & Animation -I (Open Elective)

Course Code: S1-CSC4T

Course Outcomes: -

CO1: Recall the different elements of multimedia, such as text, images, graphics, audio, and video.(Remembering).

CO2: Explain the role and significance of each element in creating effective multimedia and animation.(Understanding).

CO3: Recall different multimedia platforms, such as websites, mobile applications, and interactive presentations.(Remembering).

CO4: Explain the purpose and target audience of different multimedia platforms.(Understanding).

CO5: Demonstrate understanding of the functionalities and possibilities offered by various multimedia platforms.(understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (Computer Science Major)

Course Name: Programming Methodologies & Data Structures (Major)

Course Code: S2-CSC1T

Course Outcomes: -

CO1. Recall the basic principles of algorithm design and their application in problem-solving (Remembering)

CO12. Explain the importance of efficiency and readability in computer programming and demonstrate understanding by writing efficient and well-structured algorithms.. (Understanding)

CO3. Analyze complex problems and apply recursive techniques, pointers, and searching methods to devise efficient solutions and assess the tradeoffs among different data structure implementations.. (Analyzing)

CO4. Formulate iterative solutions and develop array processing algorithms for problems, utilizing appropriate control structures and data manipulation techniques. (Applying)

CO5. Evaluate the applications and efficiency of algorithms for searching, sorting, and other operations in different contexts. Recognize and evaluate the contributions made by Indian programmers and computer scientists in the field of programming and data structures.(Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (Computer Science Major)

Course Name: Computer System Architecture (Minor)

Course Code: S2-CSC2T

Course Outcomes: -

CO1. Recall the basic components and their functions in a digital computer, such as the central processing unit (CPU), memory, input/output devices, and bus architecture.(Remembering)

CO2. Apply Boolean algebra and logic expressions to design simple combinational digital circuits. (Understanding)

CO3. Recall the functions and operations performed by the ALU, such as arithmetic calculations and logical operations.(Understanding)

CO4. Understand the concept and advantages of parallelism, threading, multiprocessors, and multicore processors. (understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (Computer Science Major)

Course Name: Programming Methodologies & Data Structures (Open Elective)

Course Code: S2-CSC3T

Course Outcomes: -

CO1: Recall the principles of top-down design and the importance of developing algorithms and flowcharts to solve problems in programming.(Remembering)

CO2: Understand the principles of writing efficient and well-structured computer algorithms/programs.(Understand)

CO3: Learn to formulate iterative solutions and array processing algorithms for problems.(remembering)

CO4: Recall the characteristics and functions of fundamental data structures in programming(Remembering)

Government Holkar (Model Autonomous) Science College,

Programme Name: B.Sc. (Computer Science Major)

Course Name Multimedia and Animation -II (Open Elective)

Course Code: S2-CSC4T

Course Outcomes: -

CO1: Recall the different elements of multimedia, such as text, images, audio, video, and animation. Identify the basic principles and concepts related to animation..(Remembering)

CO2: Understand the significance and impact of various multimedia platforms in modern communication and media production..(Understand)

CO3: Understand the process of adding and integrating various multimedia elements into a project using appropriate software tools.(Understand)

CO4: Understand the principles of effective presentations and creative ideas in the context of multimedia .(Understand)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (2nd Year)

Course Name : Object oriented programming concept Using C++

Course Code: 206-I

Course Outcomes: -

CO1: Introduction to C++, key concepts of object-oriented programming, unformatted & formatted console I/O oprations.

CO2: Describe the parts of C++ program, tokens, oprators, Control structures.

CO3: Functions, function overloading, demonstration of Classes and objects, implementing abstraction using access specifiers.

CO4: Operator overloading, reusing code through Inheritance and its types.

CO5: Student will acquire knowledge about Pointer & Arrays of classes, implementing Polymorphism, Template, Handling Exceptions

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (2nd Year)

Course Name : Data Structure

Course Code: 206-II

Course Outcomes: -

CO1: Introduction to stack, stack application, introduction to queues, applicatons of queue.

CO2: Introduction to linked list, dynamic m/r allocation

CO3: Understanding Concept of non-linear data structure, Tree-basic terminology, Applications of binary tree

CO4: Students will learn about Searching and sorting techniques, analysis of various searching and sorting algorithms, algorithm design.

CO5: Introduction to application of Graphs, graph traversal, shortest path algorithm, hashing

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (3rd Year)

Course Name : Database Management System

Course Code: 306 - I

Course Outcomes: -

CO1: Describe the basic elements of a relational database management system.

CO2: Understanding the principles of various data models for relevant problems.

CO3: Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.

CO4: Demonstrate their understanding of key notions of query evaluation and optimization techniques.

CO5: Extend normalization for the development of application software's.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: B.Sc. (3rd Year)

Course Name : Operating System concepts

Course Code: 306 - II

Course Outcomes: -

CO1: Student will interact about evolution theory of Operating system along with various types.

CO2: Student will learn about implementation of different scheduling algorithm for processors (CPU).

CO3: Understanding of how to Apply page replacement policies for dynamic memory management

CO4: Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems, Deadlock prevention and avoidance.

CO5: Working with Linux OS. Introduction to various linux commands and VI editor etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1st Sem)

Course Name : Computers and Communication Fundamentals

Course Code: CS-11

Course Outcomes: -

CO1: Student will understand the fundamental concepts of data communication and computer networking.

CO2: Understand how errors detected and corrected that occur in transmission.

CO3: How collisions to be handled when many stations share a single channel.

CO4: They will Know about routing mechanisms and different routing protocols.

CO5: Student will Know about usage of different application layer protocols.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1st Sem)

Course Name : Discrete Structure

Course Code: CS-12

Course Outcomes: -

CO1: Be able to reason at multiple levels of detail and abstraction, being aware, in particular, of the applicability and limitations of tools from mathematics and theoretical computer science.

CO2: Recognize the context in which a computer system may function, including its interactions with people and the physical world.

CO3: Able to communicate with, and learn from, experts from different domains throughout their careers.

CO4: Possess a solid foundation that allows and encourages them to maintain relevant skills as the field evolves. CO5: To be able to manage their own career development and advancement.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1st Sem)

Course Name : Operating System

Course Code: CS-13

Course Outcomes:

CO1: Introduction and evaluation of Operating system along with various types.

CO2: Schedule CPU time using scheduling algorithm for processors.

CO3: Apply page replacement policies for dynamic memory management.

CO4: Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems, Deadlock prevention and avoidance. CO5: Working with linux OS. Introduction to various linux commands and vieditor etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1st Sem)

Course Name :

Course Code: CS-14

Course Outcomes:

CO1: General Knowledge of Programming types, Problem solving concepts, usage of Algorithm/ Flowchart. Writing, compiling and debugging programs in C language.

CO2: students will learn how to design structure of c programs, using tokens.

CO3: Formatted and unformatted I/O, control statement and Looping. Design programs containing decision structures.

CO4: Array (1-d,2-d), Functions & Recursion, string handeling. CO5: structure, preprocessor directives(macros).

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Ind Sem)

Course Name : Computer Network

Course Code: CS-21

Course Outcomes:

CO1: Student will acquire knowledge of the importance of data communications and the Internet in supporting business Communications and daily activities.

CO2: Student will be able to Analyze the services and features of the various layers of data networks. CO3: Explain how communication works in data networks and the Internet.

CO4: Recognize the different internetworking devices and their functions.

CO5: Explain the role of protocols in networking.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Ind Sem)

Course Name : Data structure using C++

Course Code: CS-22

Course Outcomes:

CO1: Introduction to C, key concepts of object-oriented programming, unformatted & formatted console I/O operations.

CO2: Parts of C program, tokens, operators, Control structures.

CO3: Functions, function overloading, demonstration of Classes and objects, implementing abstraction using access specifiers.

CO4: Operator overloading, reusing code through Inheritance and its types.

CO5: Pointer & Arrays of classes, implementing Polymorphism, Template, Handling Exceptions

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Ind Sem)

Course Name : Computer Oriented Numerical and Statistical Methods

Course Code: CS-23

Course Outcomes:

CO1: To develop the mathematical skills of the students in the areas of numerical methods.

CO2: To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems.

CO3: Finding Eigen values, eigenvectors, interpolation and applications, solving ODEs, PDEs.

CO4: To lay foundation of computational mathematics for post-graduate courses specialized studies and research.

CO5: Dealing with statistical problems like testing of hypotheses.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Ind Sem)

Course Name : Database Management System

Course Code: CS-24

Course Outcomes:

CO1: Demonstrate the basic elements of a relational database management system.

CO2: Identify the data models for relevant problems.

CO3: Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.

CO4: Demonstrate their understanding of key notions of query evaluation and optimization techniques.

CO5: Extend normalization for the development of application software 's.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1IIrd Sem)

Course Name : Object Oriented Programming with java

Course Code: CS-31

Course Outcomes:

CO1: The students will have the competence in the use of Java Programming language

CO2: The development of small to medium sized application programs that demonstrate professionally acceptable coding.

CO3: An understanding of the principles and practice of object-oriented programming in the construction of robust maintainable programs which satisfy the requirements.

CO4: Design and implement an application that demonstrates their competency with Java syntax, structure and programming logic, incorporating basic features of the language as well as some features from the I/O (Input/Output) or GUI libraries

CO5: Competence in the use of Java Programming language in the development of small to medium sized application programs that demonstrate professionally acceptable coding and performance standards.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1IIrd Sem)

Course Name : Database Applications and tools

Course Code: : CS-32

Course Outcomes:

CO1: Eliminate redundant data.

CO2: Make access to the data easy for the user.

CO3: Provide for mass storage of relevant data.

CO4: Protect the data from physical harm and un-authorized systems.

CO5: Allow for growth in the data base system and Maintaining Warehouse.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1IIrd Sem)

Course Name : Theory of computation

Course Code: : CS-33-A

Course Outcomes:

CO1: To give an overview of the theoretical foundations of computer science from the perspective of formal languages.

CO2: To illustrate finite state machines to solve problems in computing.

CO3: To explain the hierarchy of problems arising in the computer sciences.

CO4: To solve various problems of applying normal form techniques, push down automata and Turing Machines.

CO5: To familiarize Regular grammars, context frees grammar.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1IIrd Sem)

Course Name : Computer Architecture

Course Code: : CS-33-B

Course Outcomes:

CO1: To understand the structure, function and characteristics of computer systems

CO2: To understand the design of the various functional units and components of computers

CO3: To identify the elements of modern instructions sets and their impact on processor design. CO4: To explain the function of each element of a memory hierarchy

CO5: To identify and compare different methods for computer I/O.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1IIrd Sem)

Course Name : Software Engineering

Course Code: : CS-34-A

Course Outcomes:

CO1: Understand the importance of the stages in the software life cycle.

CO2: Understand the various process models.

CO3: Be able to design software by applying the software engineering principles.

CO4: To understand important concepts of software engineering and project management.

CO5: Introduction of management information system.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1IIrd Sem)

Course Name : Linux/Unix Administration

Course Code: : CS-34-B

Course Outcomes:

CO1: Learn UNIX structure, commands, and utilities.

CO2: Describe and understand the UNIX file system.

CO3: Write shell scripts in order to perform shell programming.

CO4: Acquire knowledge about text processing utilities, process management and system operation of UNIX.

CO5: Installation of software's and hardware's on Unix operating system.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Vth Sem)

Course Name : System Analysis and Design

Course Code: CS-41

Course Outcomes:-

CO1: A firm basis for understanding the life cycle of a systems development project.

CO2: An understanding of the analysis and development techniques required as a team member of a medium-scale information systems development project.

CO3: An understanding of the ways in which an analyst's interaction with system sponsors and users play a part in information systems development.

CO4: Experience in developing information systems models. CO5: Experience in developing systems project documentation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Vth Sem)

Course Name : Design and Analysis of Algorithm

Course Code: CS-42

Course Outcomes: -

CO1: Analyze the asymptotic performance of algorithms.

CO2: Demonstrate a familiarity with major algorithms and data structures.

CO3: Write rigorous correctness proofs for algorithms. CO4: Apply important algorithmic design paradigms and methods of analysis.

CO5: Synthesize efficient algorithms in common engineering design situations.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Vth Sem)

Course Name : Internet and Web Technology

Course Code: CS-43-A

Course Outcomes: -

CO1: Analyze a web page and identify its elements and attributes.

CO2: Create web pages using XHTML and Cascading Style Sheets.

CO3: Build dynamic web pages using JavaScript (Client-side programming).

CO4: Analyze to Use appropriate client-side or Server-side applications.

CO5: Build interactive web applications using crud.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Vth Sem)

Course Name : Accounting and financial management

Course Code: CS-43-B

Course Outcomes: -

CO1: Demonstrate the role of accounting in business in economic world.

CO2: Explain the principles of accounting and book keeping.

CO3: Apply accounting rules in determining financial results and preparation of financial statement. CO4: Rectify errors caused during preparation of Final accounts.

CO5: Use software in preparation of Financial Statements.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Vth Sem)

Course Name : : Computer Graphics and Multimedia

Course Code : CS-44-A

Course Outcomes: -

CO1: Students will demonstrate an understanding of contemporary graphics hardware.

CO2: Students will create interactive graphics applications in C++ using one or more graphics.

CO3: Students will create interactive graphics applications in C++ using one or more graphics application programming interfaces."

CO4: Students will write program functions to implement graphics primitives.

CO5: Students will write programs that demonstrate geometrical transformations.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Programme Name: M.Sc. (1Vth Sem)

Course Name : Compiler Design

Course Code: CS-44-B

Course Outcomes: -

CO1: Understand the major phases of compilation and to understand the knowledge of Lex tool. CO2: Develop the parsers and experiment the knowledge of different parsers design without automated tools.

CO3: Construct the intermediate code representations and generation.

CO4: Convert source code for a novel language into machine code for a novel computer.

CO5: Apply for various optimization techniques for dataflow analysis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc. (Economics Major)

Course Name: Consumer Behaviour& Micro Economics (Major)

Course Code: S1- ECO1T

Course Outcomes: -

CO1: Define the nature and scope of economics and differentiate between inductive and deductive analysis, demonstrating understanding of core economic terms. (Understanding)

CO2: Apply knowledge of consumer behavior, the laws of demand and supply, and their role in determining market equilibrium in a market economy. (Applying)

CO3: . Explain the decision-making process of firms and analyze their choices regarding optimal production levels. (Understanding)

CO4: ompare and contrast different types of market structures, and distinguish between firm and industry demand curves. (Understanding)

CO5: Evaluate various economic theories and their application in determining wage rates, interest rates, and rent under different market conditions. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc. (Economics Major)

Course Name: Micro Economics

(Minor)

Course Code: S1- ECO2T

Course Outcomes: -

CO1. Define the nature and scope of economics, distinguish between inductive and deductive analysis, and demonstrate an understanding of core economic terms. (Understanding)

CO2. Describe consumer behavior and the laws of demand and supply, and analyze how they determine market equilibrium in a market economy. (Understanding)

CO3. Explain the decision-making process of firms and their considerations in optimizing production. (Understanding)

CO4. Classify different types of market structures and analyze the differences between firm and industry demand curves. (Analyzing)

CO5. Explain various theories and factors influencing the determination of wages, interest rates, and rent in different economic conditions. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc. (Economics Major)

Course Name :Basic of Indian Economy (Open Elective)

Course Code: S1- ECO3T

Course Outcomes: -

CO1 Describe the basic features of the Indian economy and its potential in terms of natural resources, demonstrating an understanding of the key aspects and strengths. (Understanding)

CO2 RE Call the role of agriculture as the foundation of economic growth and development in India, and assess the changing nature of the agricultural sector and its contribution to the overall economy.(remembering)

CO3. Explain the industrial policy before and after independence in India, and discuss the concept of Small-Scale Industries (SSI) and Cottage Industries, along with various flagship programs supporting them. (Understanding)

CO4. Understand the infrastructural growth in India and understand the structure of India's foreign trade, demonstrating an understanding of the key components and trends(Understanding)

CO5. Understand the importance of government planning in India, assess various objectives, failures, and achievements, and introduce the concept of NITI Aayog.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc. (Economics Major)

Course Name: Indian &Agriculture Economy (Major)

Course Code: S2- ECO1T

Course Outcomes: -

CO1. Identify and describe the basic features of the Indian economy and assess its potential in terms of natural resources, demonstrating an understanding of the key characteristics. (Remembering)

CO2. Analyze the role of agriculture as the foundation of economic growth and development in India, and evaluatethe process and changing nature of the agricultural sector, along with its contribution to the overall economy. (Analyzing)

CO3. Explain the industrial policies implemented before and after independence in India, and discuss the concept of Small-Scale Industries (SSI) and Cottage Industries, including various flagship programs supporting them. (Understanding))

CO4. Demonstrate an understanding of India's infrastructural growth, and comprehend the structure of India's foreign trade, including key aspects and trends. (Understanding)

CO5 Evaluate the importance of planning undertaken by the government of India, assess various objectives, failures, and achievements, and describe the introduction and role of NITI Aayog (National Institution for Transforming India) as a policy think tank. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc. (Economics Major)

Course Name: Indian Economy (Minor)

Course Code: S2- ECO2T

Course Outcomes: -

CO1 Describe the basic features of the Indian economy and its potential in terms of natural resources, demonstrating an understanding of the key aspects and strengths. (Understanding)

CO2 RE Call the role of agriculture as the foundation of economic growth and development in India, and assess the changing nature of the agricultural sector and its contribution to the overall economy.(remembering)

CO3. Explain the industrial policy before and after independence in India, and discuss the concept of Small-Scale Industries (SSI) and Cottage Industries, along with various flagship programs supporting them. (Understanding)

CO4. Understand the infrastructural growth in India and understand the structure of India's foreign trade, demonstrating an understanding of the key components and trends(Understanding)

CO5. Understand the importance of government planning in India, assess various objectives, failures, and achievements, and introduce the concept of NITI Aayog.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc. (Economics Major)

Course Name: Basic of Indian Economy

(Open Elective)

Course Code: S2- ECO3T

Course Outcomes: -

CO1 Describe the basic features of the Indian economy and its potential in terms of natural resources, demonstrating an understanding of the key aspects and strengths. (Understanding)

CO2 RE Call the role of agriculture as the foundation of economic growth and development in India, and assess the changing nature of the agricultural sector and its contribution to the overall economy.(remembering)

CO3. Explain the industrial policy before and after independence in India, and discuss the concept of Small-Scale Industries (SSI) and Cottage Industries, along with various flagship programs supporting them. (Understanding)

CO4. Understand the infrastructural growth in India and understand the structure of India's foreign trade, demonstrating an understanding of the key components and trends(Understanding)

CO5. Understand the importance of government planning in India, assess various objectives, failures, and achievements, and introduce the concept of NITI Aayog.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc.(2Nd Year)

Course Name : Macro Economics (Economics)

Course Code: 221-I

Course Outcomes: -

CO1: Calculate National Income and demonstrate Circular flow of income.

CO2: Compare and contrast the circumstances under which it makes sense to apply the Keynsian theory of employment.

CO3: Describe working of multiplier and interpret the meaning of MEC and MEI.

CO4: Grade different measures of money supply and illustrate various versions of quantity theory of money.

CO5: Identify types of banks, interpret credit creation process of commercial banks.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc.(2Nd Year)

Course Name : Public Finance & International Economics

Course Code: 221-II

Course Outcomes: -

CO1: Identify the sources of finance of govt. and classify the types of taxes.

CO2: Describe budget process and summarize the role played by finance commission.

CO3: Identify difference between intra and international trade and its importance with reference to trade theories.

CO4: Recite terms of trade with different nations and role of International Organization in development.

CO5: Tell composition and direction of foreign trade and connect appreciation and depreciation of currency in economy.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc.(3Rd Year)

Course Name : Development of Economics (Economics)

Course Code: 321-I

Course Outcomes: -

CO1: Explain economic growth and development, illustrate factors of economic development.

CO2: Illustrate and apply various classical theories of economic growth.

CO3: Explain the concept of balanced and imbalanced growth, illustrate Harod-Domar and solow's growth model.

CO4: Explain importance of gender equality and women empowerment and techniques of production.

CO5: Realize the importance and influence of environment on the economy, suggest appropriate measures to correct environment degration.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Programme Name: B.Sc.(3Rd Year)

Course Name : Statistics

Course Code: 321-II

Course Outcomes:

CO1: Explain statistical importance and analyze statistical data graphically using frequency distribution.

CO2: Use and apply statistical averages, dispersion and location.

CO3: Employee the principles of linear regression and correlation.

CO4: Demonstrate understanding of time series and illustrate different types of Index Number.

CO5: Use basic probability rules and enhance research knowledge.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (Electronics Major)

Course Name: Semiconductor Devices (Major)

Course Code: S1-ELE1T

Course Outcomes: -

CO1: Recall and identify the behavior of semiconductor materials, including their conductivity properties and intrinsic characteristics.(Remembering)

CO2: Explain the I-V characteristics of diodes, bipolar junction transistors (BJTs), and metal-oxide-semiconductor field-effect transistors (MOSFETs), and reproduce their characteristic curves.(Understanding)

CO3: . Apply standard device models to analyze and calculate critical internal parameters of semiconductor devices, such as junction capacitance, transit time, and carrier concentrations.(Applying)

CO4: Analyze and categorize the behavior and characteristics of specific semiconductor devices, including Silicon Controlled Rectifiers (SCRs) and Unijunction Transistors (UGTs), based on their modes of operation, voltage-current relationships, and applications.(Analyzing)

CO5: Evaluate and assess the performance and limitations of different semiconductor devices in various circuit configurations, considering factors such as power dissipation, switching speed, and noise immunity.(Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (Electronics Major)

Course Name: Basic circuit theory and Network Analysis (Minor)

Course Code: S1-ELE2T

Course Outcomes: -

CO1. Recall and describe the systematic approach to studying circuits, including the consideration of circuit components, connections, and circuit laws. (Remembering)

CO2. Understand the process of formulating circuit analysis problems, focusing on solving linear systems of equations to determine circuit variables. (Understanding)

CO3. Apply network theorems, such as Kirchhoff's laws, Thevenin's theorem, and Norton's theorem, to analyze electric circuits and simplify circuit calculations. (Understanding)

CO4. Analyze the sinusoidal steady-state response of electric circuits, considering the impact of capacitors, inductors, and AC power sources, and explore circuit characteristics such as impedance, phasors, and frequency response. (Applying)

CO5. Evaluate the behavior and characteristics of interconnected two-port networks, considering parameters such as transmission parameters, scattering parameters, and network interconnection, to determine their overall response. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (Electronics Major)

Course Name: Introduction of electronic component and network (Open Elective)

Course Code: S1-ELE3T

Course Outcomes: -

CO1. Recall and describe the systematic approach to studying circuits for analysis and design purposes.(Remembering)

CO2. Understand the process of formulating circuit analysis problems in a mathematically tractable manner and emphasize solving linear systems of equations.(Understanding)

CO3. Analyze electric circuits using network theorems to simplify circuit calculations and understand circuit behavior.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (Electronics Major)

Course Name: Basic circuit theory and Network Analysis (Major)

Course Code: S2-ELE1T

Course Outcomes: -

CO1. Recall and describe the systematic approach to studying circuits for analysis and design purposes, considering factors such as circuit components, connections, and circuit laws.(Remembering)

CO2. Understand the process of formulating circuit analysis problems in a mathematically tractable manner, focusing on solving linear systems of equations to determine circuit variables. (Understanding)

CO3. Analyze electric circuits using network theorems, such as Kirchhoff's laws, Thevenin's theorem, and Norton's theorem, to simplify circuit calculations and determine circuit behavior.(Applying)

CO4. Determine the sinusoidal steady-state response of electric circuits, , and analyze circuit characteristics such as impedance, phasors, and frequency response.(Analyzing)

CO5 Evaluate the parameters of two-part networks and their overall response, demonstrating the ability to analyze and determine the characteristics of interconnected two-port networks. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (Electronics Major)

Course Name: Semiconductor Devices (Minor)

Course Code: S2-ELE2T

Course Outcomes: -

CO1. Recall the behavior and properties of semiconductor materials, including their conductivity characteristics and intrinsic properties..(Remembering)

CO2. Describe the current-voltage (I-V) characteristics of diodes, bipolar junction transistors (BJTs), and metal-oxide-semiconductor field-effect transistors (MOSFETs), and explain their relationship to device functionality.(Understanding)

CO3. . Identify and explain the significance of key internal parameters in semiconductor devices, such as junction capacitance, transit time, and carrier concentrations.(Remembering)

CO4. Apply standard device models to analyze and calculate the critical internal parameters of semiconductor devices, enabling a deeper understanding of their performance.(Applying)

CO5. Relate the behavior and properties of semiconductor materials to the I-V characteristics and internal parameters of diodes, BJTs, and MOSFETs, highlighting the importance of these relationships in device design and operation..(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (Electronics Major)

Course Name: Basic of Semiconductor Devices

(Open Elective)

Course Code: S2-ELE3T

Course Outcomes: -

CO1: Recall and identify the behavior and properties of semiconductor materials,.(Remembering)

CO2: Explain the current-voltage (I-V) characteristics of diodes, bipolar junction transistors (BJTs), and (MOSFETs), and understand their relationship to device functionality .(Understanding)

CO3: Apply standard device models to analyze and calculate critical internal parameters of semiconductor devices,. (Understanding)

CO4: Recognize and differentiate the behavior of different semiconductor materials based on their conductivity properties and intrinsic characteristics. (Remembering)

CO5: Reproduce and draw the I-V characteristics of diodes, BJTs, and MOSFETs, .(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (2nd Year)

Course Name: Digital Electronics & Microprocessor

Course Code: 207-I

Course Outcomes:

CO1: Design the any kind of combinational circuit.

CO2: Design the sequential circuits. CO3: Teach the working phenomenon of A/D and D/A converters.

CO4: Write the assembly language programs.

CO5: Interface the devices with Microprocessor 8085.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (2nd Year)

Course Name: Operational Amplifier and Instrumentation

Course Code: 207-II

Course Outcomes:

CO1: Analyze the parameters of Op-Amp.

CO2: Design the applications of Op-Amp.

CO3: Illustrate the behaviour of CRO & LCD. CO4: Demonstrate Electronic measurement equipment's.

CO5: Understand the mechanism of life saving biomedical instruments.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (3rd Year)

Course Name: Thyristors, IC Technology, Microprocessor and Electrical Motors

Course Code: 307-I

Course Outcomes:

CO1: Relate the importance of power devices in the field of high-power electronics.

CO2: Plan various methods used to fabricate integrated chips.

CO3: Categorize the application of power devices. CO4: Design and work with Electrical Motors.

CO5: Summarize 8086 microprocessor and write its Programming.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Programme Name: B.Sc. (3rd Year)

Course Name: Communication Electronics

Course Code: 307-II

Course Outcomes:

CO1: Classify on types of noise and radio wave propagation.

CO2: Correlate various generation techniques in modulation and demodulation of signals.

CO3: Interpret the idea and working of both Antenna and Television.

CO4: Categorize the concepts of mobile communication and fiber optics. CO5: Infer wireless concepts.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (Fisheries Major)

Course Name: Fish Introduction and Culture (Major)

Course Code: S1- FISH1T

Course Outcomes: -

CO1: Recall and present a brief historical background of fisheries in the context of India and understanding the evolution and development of the fisheries sector. (Bloom's Level: Remembering)

CO2: Identify and describe the anatomical features of finfish, including their external and internal structures. (Bloom's Level: Understanding)

CO3: Explain the functions of important internal organs in fishes and their roles in various systems. (Bloom's Level: Understanding))

CO4 Analyze and describe the concepts of fecundity, growth, and age determination in fish populations,. (Bloom's Level: Analyzing)

CO5: Explain the concept of parental care in fishes, describing the various forms of parental care exhibited by different fish species. (Bloom's Level: Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (Fisheries Major)

Course Name: Basic of fish Culture (Minor)

Course Code: S1- FISH 2T

Course Outcomes: -

CO1. Understand to Classify fishes into different taxonomic groups based on their characteristics Remembering)

CO2. dentify and differentiate freshwater fishes based on their physical characteristics, such as body shape, coloration, fin structure, and scales.(Applying)

CO3. Apply principles of aquarium management, including water quality control, filtration systems, feeding practices, and maintenance procedures, to create and maintain a healthy aquatic environment for fish keeping. (Bloom's Level: Applying))

CO4. Identify and classify planktonic organisms found in aquatic ecosystems, demonstrating an understanding of their morphology, ecological importance, and their role in the food chain. (Bloom's Level: Understanding)

CO5. Explain the concept of exotic and larvivorous fishes, their introduction into new ecosystems, (Bloom's Level: Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (Fisheries Major)

Course Name: Anatomy and Biology of Finfishes (Major)

Course Code: S2- FISH 1T

Course Outcomes: -

CO1. Recall and summarize the historical background of fisheries in India,. (Bloom's Level: Remembering)

CO2 Describe the anatomical features of finfish, including their external structures (. (Bloom's Level: Understanding)

CO3 Explain the functions of important internal organs in fishes and their roles in various systems (Bloom's Level: Understanding)

CO4. Analyze and interpret the concepts of fecundity, growth, and age determination in fish populations. (Bloom's Level: Analyzing)

CO5 Discuss and explain parental care in fishes, including different forms of parental care. (Bloom's Level: Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (Fisheries Major)

Course Name: Fish Introduction and Culture (Minor)

Course Code: S2- FISH 2T

Course Outcomes: -

CO1. Understand to Classify fishes into different taxonomic groups based on their characteristics, (Bloom's Level: Understanding)

CO2 dentify and differentiate freshwater fishes based on their physical characteristics. (Applying)

CO3. Explain the principles and techniques of carp culture, including breeding, rearing, and management practices for commercial production) (Bloom's Level: Understanding)

CO4. Apply principles of aquarium management, including water quality control, filtration systems, feeding practices, and maintenance procedures, (Applying)

CO5. Discuss and explain the concept of exotic and larvivorous fishes, their introduction into new ecosystems, and their impact on native species and mosquito control, demonstrating an understanding of the ecological implications and management considerations associated with these fish species. (Bloom's Level: Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (2nd Year)

Course Name: Aquaculture Fish Disease & Prawn Culture

Course Code: 213-I

Course Outcomes: -

CO1: Design Aquaculture and their culture system.

CO2: Develop Modern aquaculture techniques such as pan and cage culture.

CO3: Examine Fish food, types and different feeding habits of fishes.

CO4: Examine fish disease their causes and treatment.

CO5: Evaluate prawn culture and commercial species of prawn.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (2nd Year)

Course Name: Aquarium fishes, Ichthyology (Fish) & Post harvest techniques

Course Code: 213-II

Course Outcomes: -

CO1: Design Aquarium, their construction and different types of aquariums.

CO2: Assemble aquarium tools and their maintenance.

CO3: Sketch the Origin and evolution of fishes.

CO4: Differentiate the fishes with their nature and environment.

CO5: Examine Fish preservation and by- products of fishes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (3rd Year)

Course Name: Fisheries Economics & Extension Education

Course Code: 313-I

Course Outcomes: -

CO1: Examine Biochemical composition and nutritional value of fish.

CO2: Survey of fish marketing system and their analysis.

CO3: Organize Fisheries co-operatives.

CO4: Execute Govt. assistance in fisheries sector.

CO5: Discuss about Fisheries extension education.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: B.Sc. (3rd Year)

Course Name: Limnology and Fish Productivity

Course Code: 313-II

Course Outcomes: -

CO1: Explain Limnology their definition, history and scope.

CO2: Discuss about Primary productivity of fish pond.

CO3: Examine Reservoir fisheries.

CO4: Describe Lentic and lotic fisheries resource of India.

CO5: Analysis Aquatic pollution causes and types.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (Ist Semester)

Course Name: Fish Anatomy & Physiology

Course Code: F-11

Course Outcomes:

CO1: Discuss diversity of fish and general information about different group of fishes.

CO2: Demonstrate digestive Osmoregulatory, excretory system of fish and different structure of mouth, fins and scales in fishes. CO3: Analysis respiratory and circulatory system of fish.

CO4: Experiment of Osteology and coloration in fishes.

CO5: Experiment related to Nervous system of lateral line system in fishes

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (Ist Semester)

Course Name: Fish Breeding and Hatchery Technology

Course Code: F-12

Course Outcomes

CO1: Analysis fish reproductive system and factor affecting reproduction.

CO2: Evaluate different techniques of fish breeding and breeding requirement.

CO3: Experiment related to water quality parameters and hatchery construction.

CO4: Assessment of brood stock management and nutritional requirement of different stages of fish.

CO5: Discuses hybridization and transportation of fish

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (Ist Semester)

Course Name: Aquaculture

Course Code: F-13

Course Outcomes :

CO1: Analysis Aquaculture scenario and aquaculture apparatus.

CO2: Understand Biology of exotic and Indian major carp's species.

CO3: Develop Cage cultivator and Pen culture. CO4: Examine different fish culture systems and their importance.

CO5: Analysis different non-fish culture systems and their importance.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (Ist Semester)

Course Name: Crustacean Mollusca and Echinoderm Fisheries

Course Code: F-14

Course Outcomes

CO1: Examine lobster and crab fisheries.

CO2: Analysis prawn and chank fisheries.

CO3: Discuss pearl Biology, Fisheries and their economic value.

CO4: Understand mussels' biology, culture and their economic importance.

CO5: Identify and understand sea cucumber, Sepia and Octopus fisheries.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IInd Semester)

Course Name: Biostatistics and Instrumentation

Course Code: F-21

Course Outcomes:

CO1: Experiment relate different statistical techniques like data collection, mean, mode, median their application in fisheries.

CO2: Evaluate T-Test Chi-square test and tools used in quantitative fisheries economics.

CO3: Understand biochemical technique like centrifugation, colorimeter, spectroscopy and their application.

CO4: Perform Electrophoresis, Chromatography, PCR their Principal, Procedure and application.

CO5: Analysis Microtomy Principal Procedure and its application.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IInd Semester)

Course Name: Aquatic Biology

Course Code: F-22

Course Outcomes

CO1: Discuss Biotic & Abiotic components of fresh water ecosystem.

CO2: Classify Biotic & Abiotic component of marine water ecosystem.

CO3: Analysis of productivity and role of planktons in Aquatic ecosystem. CO4: Sketch the food chain & food web of fresh & marine water and effected environmental factor on it.

CO5: Examine the microbes their culture and importance.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IInd Semester)

Course Name: Fisheries Resource Management

Course Code:F-23

Course Outcomes

CO1: Differentiate Inland fisheries resource of India, Riverine system and their fisheries.

CO2: Classify brackish water resources of India and their fisheries.

CO3: Sketch the Marine water resources of India, Importance and their fisheries.

CO4: Illustrate Cold water resources of India & their fisheries.

CO5: Identify endangered & threatened fish spp. and their conservation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IInd Semester)

Course Name: Harvest and Post-Harvest Technology

Course Code: F-24

Course Outcomes

CO1: Examine fishing crafts their material and operation method.

CO2: Discuss fishing gears; their material principal and operation method.

CO3: Analysis Composition of fishes and their freshness test.

CO4: Demonstrated preservation techniques and their types.

CO5: Discuss Unconventional fishing method and quality control in processing and preservation unit.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IIIrd Semester)

Course Name: Fisheries Economics and Marketing

Course Code: F-31

Course Outcomes

CO1: Understand bio economic analysis and natural resource economics.

CO2: Classify Fisheries resources management their policies and production principles.

CO3: Discuss different law related to economics and various production functions.

CO4: Analysis Economics of different culture system and market development parameters.

CO5: Analysis of Socio-economic status of fishermen communities.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IIIrd Semester)

Course Name: Basic of Computer Application

Course Code: F-32

Course Outcomes

CO1: Classify Computers their types, working mechanism and generation of computer.

CO2: Design input, output devices and operating system.

CO3: Experiment relate to M.S. Office and their parts.

CO4: Use of communication media and computer networks. CO5: Application of computer in fisheries field and websites.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IIIrd Semester)

Course Name: Ornamental Fisheries (Elective -1)

Course Code: F-33-A

Course Outcomes

CO1: Construction of various types of aquarium and foods for aquarium fishes.

CO2: Examine water parameters for aquarium fishes and aquarium tools.

CO3: Discuss biology of different aquarium fishes.

CO4: Experiment relate to breeding of different ornamental fishes.

CO5: Analysis diseases of aquarium fishes and aquatic plants for aquarium

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IIIrd Semester)

Course Name: Ecotoxicology and Pollution (Elective -1)

Course Code: F-33-B

Course Outcomes

CO1: Connect types of toxic substances, dose-response relationship and phase I and II reaction for detoxification.

CO2: Illustrate tissue and organ specificity of toxicity in correlation with food toxicology.

CO3: Criticize the use of pesticides, insecticide, herbicide in agriculture practices.

CO4: Compare the effects of various pollutants on the survival of living system.

CO5: Categorize the toxins released by natural and household products and their test fortoxicity.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IIIrd Semester)

Course Name: Environmental Pollution (Fish &Fishriesh) (Elective-2)

Course Code: F-34-A

Course Outcomes

CO1: Illustrate pollution ecology and source of pollution.

CO2: Classify different types of pollution and their effects.

CO3: Discuss bioassay study and Biomedical waste.

CO4: Analysis biogeochemical cycles and xenobiotic.

CO5: Classify aquaculture and their basic concepts.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IIIrd Semester)

Course Name: Ecology of Culture Systems (Elective-2)

Course Code: F-34-B

Course Outcomes

CO1: Discuss ecological water parameter and effect of monsoon on different water culture system. CO2: Analysis coastal ecosystem environment.

CO3: Evaluate primary and secondary production analysis in coastal regions.

CO4: Appraise microbiology in culture system.

CO5: Analysis aerobic and anaerobic degradation of organic matter.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IVth Semester)

Course Name: Fish Genetics and Biotechnology

Course Code: F-41

Course Outcomes

CO1: Understand introduction and principle of genetics.

CO2: Illustrate hybridization in fishes & chromosomal manipulation.

CO3: Discuss recombinant DNA techniques Southern, Northern and Western blotting.

CO4: Uses of DNA, RNA hybridization transgenes and their application.

CO5: Illustrate to fish cell culture principle, methods and application.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IVth Semester)

Course Name: Fish Nutrition and Feed Technology

Course Code: F-42

Course Outcomes :

CO1: Examine basic food their types and function like carbohydrates, lipid, protein, enzymes & nucleic acids.

CO2: Differentiate lipids, proteins, vitamin, minerals and their functions.

CO3: Formulation of fish food, Antinutritional factors and their effect.

CO4: Analysis fish food manufacture unit, processing principle and quality control.

CO5: Examine natural food for fish their types & culture techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IVth Semester)

Course Name: Fish Health Management (Elective -1)

Course Code: F- 43-A

Course Outcomes

CO1: Examine mycotic and bacteriological disease of fish, diagnosis and their treatment.

CO2: Differentiate protozoan, crustacean and Helminthes diseases of fish, life cycle of pathogen.

CO3: Analysis of viral bacterial, microbial pathogen diseases and their treatment.

CO4: Understand fish immunology: immune globules structure types function and hematopoietic tissue type.

CO5: Discuss fish therapy: vaccination, strategies production and administration.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IVth Semester)

Course Name: Fishery Technology and Fish Pathology (Elective -1)

Course Code: F-43-B

Course Outcomes

CO1: Experiment relate to pond management techniques, gears- crafts of inland water and water pollution.

CO2: Identify planktons and their role in fisheries.

CO3: Classify fish market system.

CO4: Analysis fish preservation techniques such as canning, drying etc.

CO5: Discuss EUS (Epizootic Ulcerative Syndrome) History areas affected and its socio economics impact.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IVth Semester)

Course Name: : Nutritional Management in Aquaculture (Elective- 2)

Course Code: F-44-A

Course Outcomes

CO1: Experiment relate to soil and water quality management.

CO2: Analysis major and micronutrient and their effect on fish production.

CO3: Classify biotic and microbial community and their significance.

CO4: Sketch the food chain, food web and bacterial biomass and their role in organic production.

CO5: Sketch the fish survey, acoustic & aerial method and rational fishery management.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Fisheries

Programme Name: M.Sc. (IVth Semester)

Course Name: Fisheries Economics and Extension (Elective- 2)

Course Code: F-44-B

Course Outcomes

CO1: Analysis fisheries economics and its role in different resources.

CO2: Understand low of economics, marketing of fish product and problems in marketing.

CO3: Discuss about fisheries administration, legislation and financial assistance.

CO4: Classify fisheries extension, importance of team work in extension.

CO5: Understand different training methods for aquaculture, role of communication model and channels in fisheries extension.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (Forensic Science Major)

Course Name: Criminal Investigation and Law (Major)

Course Code: S1- FOSC1T

Course Outcomes: -

CO1: Evaluate and assess the elements of crime and their different types, understanding the distinctions between various offences.(Evaluating)

CO2: Analyze and describe the organizational setup of police services at the national and state levels. (Analyzing)

CO3: . Explain the Crime Scene management protocol and its significance in the criminal justice system,(Understanding)

CO4: Examine the application of different laws and legal principles followed in criminal investigations, including laws related to evidence, search and seizure,. (Analyzing)

CO5: Synthesize the knowledge acquired from the course to pursue career opportunities in police services, private detective agencies, or security agencies.(Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (Forensic Science Major)

Course Name: Introduction to Forensic Science and Criminalistics (Minor)

Course Code: S1- FOSC2T

Course Outcomes: -

CO1. Understand the organizational structure of forensic science laboratories in India, including their setup and functioning. (Understand)

CO2. Comprehend the methods employed for searching and documenting crime scenes, with an emphasis on ensuring security and preserving evidence. (Understanding)

CO3. Recognize the significance of physical evidence in criminal investigations, and its role in establishing facts and determining the truth.(Understanding)

CO4. Learn the techniques involved in collecting, packaging, labeling, and submitting various types of physical and trace evidence found at crime scenes, ensuring proper handling and preservation. (Understanding)

CO5. Develop the knowledge and skills required to pursue a career in forensic science. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (Forensic Science Major)

Course Name: Basics of Forensic Science (Open Elective)

Course Code: S1- FOSC3T

Course Outcomes: -

CO1. Understand the organizational structure and setup of forensic science laboratories in India, including their roles, functions, and the various departments involved.(Understand)

CO2 Discuss about the methods and techniques used to secure, search, and document crime scenes, emphasizing the importance of preserving the integrity of the scene and collecting relevant evidence.(Understanding)

CO3. Recognize the significance of physical evidence in criminal investigations, understanding its role in establishing facts, linking suspects to the crime scene, and providing valuable insights for the investigation.(Understanding)

CO4. Gain knowledge and skills in the proper collection, packaging, labeling, and forwarding of different types of physical and trace evidence found at crime scenes,.(Understanding)

CO5. Develop an understanding of the potential career paths in the field of forensic science.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (Forensic Science Major)

Course Name: Introduction to Forensic Science and Criminalistics (Major)

Course Code: S2- FOSC1T

Course Outcomes: -

CO1. Analyze and evaluate the organizational setup of forensic science laboratories in India, considering their structure, functions, and role in criminal investigations.(Analyze)

CO2. Apply systematic and scientific methods for searching and documenting crime scenes, demonstrating proficiency in maintaining security, collecting evidence, and recording observations.(Apply)

CO3. Assess the importance of physical evidence in criminal investigations, critically evaluating its relevance, reliability, and probative value in establishing facts and supporting legal conclusions. (Evaluate)

CO4. Demonstrate advanced skills in collecting, packaging, labeling, and forwarding different types of physical and trace evidence found at crime scenes, ensuring adherence to legal protocols and maintaining the integrity of the evidence.(Apply)

CO5 Synthesize and integrate knowledge from the course to pursue diverse career paths in forensic science. (Evaluate)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (Forensic Science Major)

Course Name: Criminal Investigation and Law (Minor)

Course Code: S2- FOSC2T

Course Outcomes: -

CO1. Recognize and understand the organizational setup of forensic science laboratories in India.(Understand)

CO2 Explain the methods and techniques used in searching and documenting crime scenes, emphasizing the importance of preserving the integrity of evidence and maintaining chain of custody.(Understanding)

CO3. Recognize the significance of physical evidence in criminal investigations, understanding its role in establishing facts, linking suspects to the crime scene, and supporting or refuting witness statements.(Understanding)

CO4. Understand the techniques for collecting, packaging, labeling, and forwarding different types of physical and trace evidence.(Understanding)

CO5. Gain knowledge and awareness of career opportunities in forensic science.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (Forensic Science Major)

Course Name: Crime Investigation and Criminal Justice System

(Open Elective)

Course Code: S2- FOSC3T

Course Outcomes: -

CO1: Understand the fundamental elements of a crime and its various types, including the essential components required to establish criminal liability.(Understand)

CO2: Recognize and describe the organizational structure and setup of the Police at the National and State levels, including the roles and responsibilities of different departments and units.(Understanding)

CO3: Explain the protocols and procedures involved in Crime Scene.(Understanding)

CO4: Gain knowledge about the different laws and legal principles followed in criminal investigations.(Remembering)

CO5: Understand the potential career opportunities available after completing the course.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (2nd Year)

Course Name: : Indian Penal Code, Criminal Procedure Code, Indian Evidence Act and Judicial system

Course Code: 222-I

Course Outcomes:

CO1: Describe Indian penal code.

CO2: Describe criminal procedure code.

CO3: Describe Indian evidence act.

CO4: Classify Indian judicial system.

CO5: Co-relate forensic science with Indian judicial system.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (2nd Year)

Course Name: Examination of Physical Evidences & Forensic Ballistics

Course Code: 222-II

Course Outcomes:

CO1: Describe fingerprint and its examination.

CO2: Understand documents and handwriting.

CO3: Discuss identification of saliva, urine, blood and DNA & its analysis.

CO4: Recognize firearm and ammunition.

CO5: Explain hair, fibre, glass & fire related cases.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (3rd Year)

Course Name: Forensic Medicine and Toxicology

Course Code: 321-I

Course Outcomes:

CO1: Understand medical jurisprudence.

CO2: Understand forensic pathology.

CO3: Memorize forensic psychiatry.

CO4: Understand forensic toxicology.

CO5: Understand clinical toxicology.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: B.Sc. (3rd Year)

Course Name: Detective Tools and Techniques

Course Codec : 322-II

Course Outcomes: -

CO1: Interprete different detective tools.

CO2: Understand microscopy and chromatography.

CO3: Explain spectroscopy and electrophoresis.

CO4: Understand centrifugation and radio isotopic method.

CO5: Understand molecular biology.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (ISt Sem.)

Course Name: Forensic Science and Criminal Justice System

Course Code: FS-11

Course Outcomes: -

CO1: Memorize fundamental principle of forensic science

CO2: Identify the importance and effects of forensic science to humankind.

CO3: Discuss different types of police system & their working.

CO4: Discuss forensic science in India.

CO5: Understand relationship between courts, forensic science and police.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (ISt Sem.)

Course Name: Forensic Medicine

Course Code: FS-12

Course Outcomes: -

CO1: Understand Forensic medicine and legal procedures of court.

CO2: Apply the different parameters of personal identification.

CO3: Relate the Injuries and their medico legal importance.

CO4: Interpret the death, post-mortem changes and death due to asphyxia.

CO5: Discuss Post-mortem examination and sexual offences.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (ISt Sem.)

Course Name: Questioned Documents, Finger Prints and Other Prints

Course Code: FS-13

Course Outcomes:

CO1: Explain questioned documents & to understand different types of ink and paper & its examination.

CO2: Interpret handwriting & signature and its examination.

CO3: Identify different types of typewriting, forged documents and its examination.

CO4: Discuss different types of fingerprint and its examination.

CO5: Discuss different types of foot & footwear print, others print & its examination.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (ISt Sem.)

Course Name: Instrumental Method – Physical

Course Code: FS-14

Course Outcomes: -

CO1: Understand different types of spectroscopy.

CO2: Memorize and relate the principle and instrumentation of UV- Vis techniques.

CO3: Understand radio chemical techniques.

CO4: Understand IR spectroscopy.

CO5: Recognize qualitative and quantitative analysis of forensic samples.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IInd Sem.)

Course Name: Instrumental Method – Chemical

Course Code: FS-21

Course Outcomes: -

CO1: Understand Different Sample preparation and treatment techniques.

CO2: Describe the Principle and application of optical microscopy and electron microscopy.

CO3: Understand the Principle, instrumentation and application of various chromatographic techniques.

CO4: Analyze he various types ofelectrophoretic techniques.

CO5: Understand Principle and instrumentation of mass spectrometry & hyphenated techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IInd Sem.)

Course Name: Forensic Biology

Course Code: FS-22

Course Outcomes: -

CO1: Memorize the human body system.

CO2: Understand different body fluids, preservation and their analysis.

CO3: Understand teeth and its examination procedure.

CO4: Explain about the hair, fibre and their examination & importance of botanical evidences.

CO5: Classify and understand the importance of insects and wildlife in forensic science.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IInd Sem.)

Course Name: Forensic Chemistry and Explosives

Course Code: FS-23

Course Outcomes:

CO1: Explain Forensic Chemistry, beverages and their analysis.

CO2: Define different types of Drug of abuse and their analysis.

CO3: Interpret the petroleum product, Cement and other chemical.

CO4: Identify and relate the fire and arson.

CO5: Understand different types of Explosive.

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Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IInd Sem.)

Course Name: Forensic Toxicology and Pharmacology

Course Code: FS-24

Course Outcomes: -

CO1: Define different types of poisons.

CO2: Recognize the medico legal aspect of sign and symptoms of poisoning.

CO3: Memorize drugs of abuse and its analysis process.

CO4: Describe pharmacological pathway of drugs.

CO5: Understand relationship between police officer & doctor in medico legal cases.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Forensic Ballistics

Course Code: FS-31

Course Outcomes: -

CO1: Understand firing and trajectory formation.

CO2: Discuss and understand internal ballistics.

CO3: Explain types of bullet wound.

CO4: Explain types of ammunition.

CO5: Analyze types of GSR.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Instrumental methods- Biology

Course Code: FS-32

Course Outcomes: -

CO1: Understand different methods of sample analysis.

CO2: Explain enzymatic and centrifugation techniques and its application.

CO3: Explain RIA, ELISA and immunelogical techniques.

CO4: Understand applied genetic engineering.

CO5: Understand cell and tissue culture.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Forensic Serology

Course Code: FS-33-A

Course Outcomes:

CO1: Discuss bio molecule, their importance and examination.

CO2: Understand genetics and gene.

CO3: Understand immune system.

CO4: Understand origin of species.

CO5: Analyze blood groups and different types of markers.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Finger Prints, Impressions and Their Examination

Course Code: FS-33-B

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Course Outcomes:

CO1: Understand finger print history & classification of fingerprint.

CO2: Understand types, patterns and others peculiarities of fingerprint.

CO3: Interpret developmental methods of fingerprint.

CO4: Understand foot & footwear print, skid marks, tyre marks and other impressions.

CO5: Memorize the examination of other impressions such as skid, tyre etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: DNA Profiling

Course Code: FS-34-A

Course Outcomes: -

CO1: Understand gene, configuration of nucleic acid and chromosomes.

CO2: Analyze detection techniques in DNA profiling.

CO3: Interpret handling, collection, presentation and storage of DNAsamples.

CO4: Understand Ethics, validation and forensic issues of DNA samples.

CO5: Interpret legal prospective of DNA profiling.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Pharmaceutical Jurisprudence

Course Code: FS-34-B

Course Outcomes:

CO1: Define pharmaceutical and drugs legislation in India.

CO2: Memorize acts, rules related to drugs and cosmetics.

CO3: Memorize acts, rules related to food safety, adulteration & factories.

CO4: Memorize intellectual properties related laws and rights.

CO5: Understand patent law.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IVth Sem.)

Course Name: Forensic Physics

Course Code: FS-41

Course Outcomes: -

CO1: Define glass, dust, soil, paint, cement, tool marks & their importance.

CO2: Understand tool marks, types and its analysis.

CO3: Understand voice and speaker identification.

CO4: Memorize crime scene photography.

CO5: Interpret Statistics and math.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IVth Sem.)

Course Name: Applied Forensic Science and Scientific Investigation of Crime

Course Code: FS-42

Course Outcomes:

CO1: Define crime scene, types and physical evidences.

CO2: Memorize different types of patterns.

CO3: Interpret scientific investigation of motor vehicle, fire and arson cases.

CO4: Discuss civil and criminal cases.

CO5: Understand forensic science Career.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IVth Sem.)

Course Name: Emerging Trends in Forensic Science

Course Code: : FS-43-A

Course Outcomes: -

CO1: Understand voice production and their analysis. CO2: Describe polygraph.

CO3:Describe brain mapping.

CO4: Describe narco-analysis.

CO5: Understand DNA profiling.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IVth Sem.)

Course Name: Forensic Psychology

Course Code: : FS-43-B

Course Outcomes: -

CO1: Memorize history, ethics, scope of forensic psychology.

CO2: Understand different assessment test of psychology and application.

CO3: Explain abnormal behaviour of criminal.

CO4: Explain juvenile delinquency.

CO5: Interpret mental illness and their analysis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IVth Sem.)

Course Name: Biometrics

Course Code: : FS-44-A

Course Outcomes: -

CO1: Define biometric.

CO2: Discuss fingerprint and computerization of pattern& analysis.

CO3: Explain speaker and voice identification analysis.

CO4: Interpret face recognition method.

CO5: Understand bio or DNA microchip and other advance methods.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Programme Name: M.Sc. (IVth Sem.)

Course Name: Computer & Cyber Forensic

Course Code: : : FS-44-B

Course Outcomes:

CO1: Explain and Summarize Computer & Internet.

CO2: Memorize Computer Crime.

CO3: Understand Internet & Digital Crime.

CO4: Understand Computer & Cyber Crime.

CO5: Explain social media, Cryptography & Stenography.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (Geography Major)

Course Name: Human Geography : Environment and Culture (Major)

Course Code: S1- GEOG1T

Course Outcomes: -

CO1: Understand historical development of human geography and its relationship with other sciences. (Understanding)

CO2: Analyze man-environment relationship and subject dichotomies for growth. (Applying)

CO3: Identify major environmental regions, explain racial composition, and understand human adaptation. (Understanding)

CO4: Analyze population dynamics, migration, and importance of human resources. (Analyzing)

CO5: Explain settlement origin, classification, hierarchy, morphology, distribution, and associated problems. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (Geography Major)

Course Name: Physical Geography: Lithosphere Geomorphology (Minor)

Course Code: S1- GEOG 2T

Course Outcomes: -

CO1. Understand the nature, scope, and theories of the solar system's origin, referencing geological evidence and the Geological Time Scale. Understanding)

CO2. Explain the Earth's internal structure, types of rocks, and isostatic adjustment concepts. (Understanding)

CO3. Understand continental drift, plate tectonics, and geophysical phenomena like volcanoes, earthquakes, and tsunamis. Describe active forces on Earth. (Understanding)

CO4. Describe denudation processes, landscape shaping, and relief reduction principles and theories. (Understanding)

CO5. Identify landforms, their distribution, and developmental stages. Apply geomorphological principles in fieldwork. (Apply)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (Geography Major)

Course Name : Physical Geography (Open Elective)

Course Code: S1- GEOG 3T

Course Outcomes: -

CO1 1 Understand the nature, scope, and theories of the solar system's origin, referring to geological evidence and the Geological Time Scale.(Understanding)

CO2 Explain the Earth's internal structure, different rock types, crustal movement, and associated landforms shaped by geomorphic processes.(Understanding)

CO3. Understand the elements of weather and climate, atmospheric processes, and global climatic classifications. (Understanding)

CO4. Understand and demonstrate the hydrological cycle, including the physical properties and movements of oceanic water. Recognize marine resources and represent ocean bottom relief features on a map. (Remembering)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (Geography Major)

Course Name: Physical Geography:

Lithosphere Geomorphology (Major)

Course Code: S2- GEOG 1T

Course Outcomes: -

CO1. Understand the nature and scope of the subject, and demonstrate knowledge of the origin of the solar system and geological evidence. (Remembering)

CO2. Explain the internal structure of the Earth, different rock types, and concepts related to isostatic adjustment. (Understanding)

CO3 Understand and illustrate the concepts of continental drift, plate tectonics, and geological phenomena such as volcanoes, earthquakes, and tsunamis. Describe internal and external forces acting on the Earth. . (Applying)

CO4. Describe various theories and principles related to denudation processes that shape the landscape and reduce relief. (Analyzing)

CO5 Identify and classify various landforms, understand their developmental stages and associated processes. Apply geomorphological principles and techniques in fieldwork. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (Geography Major)

Course Name: Human Geography : Environment and Culture (Minor)

Course Code: S2- GEOG 2T

Course Outcomes: -

CO1. Understand and explain the basic concepts of Human Geography, including its historical development and relationship with other sciences. (Remembering)

CO2 Analyze various concepts related to the relationship between humans and the environment, and understand the dichotomies within the subject for its growth. (Understanding)

CO3. Understand and explain the concept of human adaptation to the environment. (Understanding)

CO4. Understand and analyze population dynamics, migration patterns, and the importance of human resources and their development. (Understanding)

CO5. Explain the causes of the origin of settlements, classify them as rural or urban, understand their hierarchy, morphology, distribution patterns, and identify associated problems. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (Geography Major)

Course Name: Environmental Issues and Disaster Management (Open Elective)

Course Code: S2- GEOG 3T

Course Outcomes: -

CO1: Describe the environment, its classification, and its relationship with humans, focusing on contemporary issues such as environmental degradation, pollution, global warming, and disaster management. (Remembering)

CO2: Classify various disasters and evaluate techniques for their management and conservation. (Understanding)

CO3: Evaluate the quality of human life and its relationship with the environment.(Understanding)

CO3: Implement various environmental laws and principles to protect and conserve the environment at local and regional levels (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (Geology Major)

Course Name: Physical Geology (Major)

Course Code: S1- GEO1T

Course Outcomes: -

CO1: Gain a comprehensive understanding of geology as a field of study, including its branches and the significance of studying the solar system and Earth as a dynamic body. Also, comprehend the concepts related to the origin, age, and interior structure of the Earth. (Remembering)

CO2: Illustrate and explain the phenomena of earthquakes, volcanoes, isostasy, continental drift, and sea floor spreading. ,(Understanding)

CO3: . Understand and describe the concept of plate tectonics, Mid-oceanic ridges, trenches, and island arcs, recognizing their association with plate boundaries and their impact on the Earth's crust,(Understanding)

CO4: Comprehend the fundamental principles of geomorphology, establishing connections between rock weathering, soil formation, and landforms. Identify the processes involved and their influence on shaping the Earth's surface.(Applying)

CO5: Gain knowledge about the geological processes and landforms associated with rivers, wind, glaciers, underground water, and the ocean. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (IInd Year)

Course Name: : Physical Geography (Atmosphere and Hydrosphere)

Course Code: 223-I

Course Outcomes: -

CO1: The students will be able to differentiate between weather and climate and also identify their elements.

CO2 They will be able to demonstrate their knowledge about the chemical and physical (Layers) composition of the atmosphere and its importance.

CO3: The students will be able to illustrate the physical principles and processes governing the distribution of atmospheric temperature, pressure and circulation both horizontally and vertically. They will be able to explain the mechanism of heating and cooling of atmosphere.

CO4: Students will be able to identify various forms of condensation and explain their formation process. They will be able to describe various atmospheric phenomena like Air Masses, Fronts, and Cyclones along with their characteristics and classification.

CO5: They will be able to compare different climatic classification schemes of the world.

CO6: The students will be able to explicate the bottom relief as well as the distribution and controlling factors of temperature, density and salinity of oceanic water of all oceans.

CO7: They will be able to demonstrate various movements of oceanic water (Waves, Currents and Tides), their distribution and theories regarding their origin.

CO8: They will be able to explain the concept of coral reefs and theories of their origin along with the problem of coral bleaching.

CO9: They will also be able to examine various Laws of the Sea and Marine Pollution.

CO10 : The students will be able to expound various oceanic deposits as well as analyze the contemporary and potential oceanic resources.

CO11 : They will also be able to create maps of various global atmospheric and hydrosphere phenomena.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (IInd Year)

Course Name: Economic Geography

Course Code: 223-II

Course Outcomes: -

CO1: The students will be able to explain the nature and scope of the subject along with different economic activities and sectors of economy (primary, secondary and tertiary).

CO2: They will be able to review different methods of measuring economic development and assess the problems coming in it.

CO3 The students will be able to analyze the regional and global pattern of production and distribution of different agricultural crops, minerals and energy resources.

CO4: Students will be able to explain the concept of regions, their types and formulation. They will also be able to evaluate various programs launched by the Government of India for reducing regional imbalance in socio-economic development of the country.

CO5: Students will be able to explain the favorable conditions for localization, growth and distribution of different industries in the world.

CO6: They will be able to explicate the concept of globalization and examine its impact on world economy.

CO7: They will be able to appraise the significance of different means of transportation and factors affecting them. They will be able to demonstrate different important land, water and air transport routes of the world and create map of it.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (IIIrd Year)

Course Name: Geography of India

Course Code: -323-I

Course Outcomes: -

CO1: The students will be conversant about their own country's physiographic features, climate, geological structure, drainage and natural vegetation. They will be able to describe and locate these features on map also.

CO2: They will be able to evaluate the river linking programs along with energy crisis and wild life conservation in India.

CO3: Students will be able to analyze the characteristics and regional distribution of population, resources, industries and agricultural activities in India.

CO4: Students will be able to locate on a map major physical feature, cultural regions, economic features (resources, industries, agricultural regions etc.).

CO5: The students will be able to demonstrate the physical and cultural (socio-economic) aspects of their own state i.e. Madhya Pradesh and locate them on map.

CO6: Students will understand the political aspect of the country and examine the geographical basis of Indian Federalism.

CO7: They will be able to address various problems related to India's international boundaries issues and cross border terrorism.

CO8: They will be able to critically analyze geopolitics of South Asia and Indian Ocean territory along with the role of India in world affairs and its relationship with neighbouring countries.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Programme Name: B.Sc. (IIIrd Year)

Course Name: Environment and Resource Management

Course Code: -323-II

Course Outcomes: -

CO1: Students will be able to describe about environment, its classification and its relationship with man especially focusing on contemporary issues like environmental degradation, pollution, global warming, disaster management etc.

CO2: They will be able to classify various disasters and evaluate the techniques of their management and conservation.

CO3: They will be able to explain the importance of biodiversity relate it with sustainable development.

CO4: They will be able to evaluate the quality of human life and its relationship with environment.

CO5: Students will be able to implement various environmental laws and principles in protecting and conserving environment on local as well as regional levels.

CO6: Students will be able to explicate the genesis, properties and distribution of soil, flora and fauna in the world. They will also be able to identify the problems regarding them and propose solutions for them.

CO7: They will be able to assess various contemporary environmental issues on local, regional and national levels and analyze them.

CO8: Students will be able to explain ecological principles underpinning management of resources, populations, communities, and ecosystems.

CO9: They will be able to illustrate and create map of the resource regions of India.

CO10: Students will be able to synthesize geographic knowledge and apply innovative research strategies to solve problems in resource conservation, environmental change, and sustainable development within the community, region, and world.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (Geology Major)

Course Name: Crystal and Mineral Science (Minor)

Course Code: S1- GEO2T

Course Outcomes: -

CO1. Acquire knowledge about minerals and crystals, including their properties, types, and occurrences. (Remembering)

CO2. Understand the fundamental laws of crystallography and gain knowledge about symmetry elements and twinning in crystals. (Understanding)

CO3. Demonstrate knowledge of the physical properties of minerals, enabling the identification and categorization of rock-forming minerals both in laboratory settings and in the field. Acquire skills in using a polarizing microscope to identify and classify minerals. (Understanding)

CO4. Gain knowledge of the optical properties of rock-forming minerals and understand their correlation with the physical, chemical, and other characteristics of minerals. (Understanding)

CO5. Illustrate the composition, silicate structure, classification, and mineralogical properties of various mineral groups, showcasing an understanding of the diverse nature of minerals. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (Geology Major)

Course Name :Elements of Geology (Open Elective)

Course Code: S1- GEO3T

Course Outcomes: -

CO1 Gain preliminary knowledge of geology, its branches, and its importance, and develop an understanding of the origin of the Earth.(Remembering)

CO2 Understand the solar system and Earth as a dynamic body, including its interior structure.(Understanding)

CO3. Develop an understanding of the atmosphere, hydrosphere, and biosphere, and comprehend the origin of oceans, continents, and mountains (Understanding)

CO4. Acquire knowledge about the age of the Earth, geological processes, and the formation of landforms such as rivers and oceans. Gain an understanding of volcanoes, earthquakes, and geogenic hazards Understanding)

CO5. Explore the geological work of winds, underground water, and glaciers, and their role in shaping landforms. Develop knowledge about karst topography and deserts.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (Geology Major)

Course Name: Crystal and Mineral Science (Major)

Course Code: S2- GEO1T

Course Outcomes: -

CO1. Acquire knowledge of minerals and crystals, including their characteristics and classifications.(Remembering)

CO2. Understand the laws of crystallography and relate them to the symmetry elements of crystals. Gain an understanding of twinning in crystals.(Understanding)

CO3. Demonstrate knowledge of the physical properties of minerals, enabling the identification and categorization of rock-forming minerals in laboratories and field settings. Gain proficiency in using a polarizing microscope to identify and classify minerals.(Applying)

CO4. Develop an understanding of the optical properties of rock-forming minerals and their correlation with their physical, chemical, and other characteristics.(Analyzing)

CO5 Illustrate the mineral composition, silicate structure, and classification systems used to categorize minerals. Gain knowledge of the mineralogical properties of various mineral groups.(Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (Geology Major)

Course Name: Criminal Investigation and Law (Minor)

Course Code: S2- GEO2T

Course Outcomes: -

CO1. Understand the concepts of the origin, age, and interior structure of the Earth..(Remembering)

CO2 Illustrate and explain the fundamental aspects of earthquakes, volcanoes, isostasy, continental drift, and sea floor spreading, demonstrating an understanding of their characteristics and processes.(Understanding)

CO3 Understand and illustrate the concept of plate tectonics, including the formation of mid-oceanic ridges, trenches, and island arcs, and recognize their significance in the Earth's geology.(Understanding)

CO4. Comprehend the basic principles of geomorphology and establish connections between rock weathering, soil formation, and landforms, recognizing the processes involved.(Understanding)

CO5. Gain knowledge about the geological processes related to rivers, wind, glaciers, underground water, and the ocean.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (Geology Major)

Course Name: Minrals and Rocks

(Open Elective)

Course Code: S2- GEO3T

Course Outcomes: -

CO1: Gain knowledge about mineralogy, including the study of minerals and their classification systems Remembering)

CO2: Acquire knowledge about the physical and optical properties of minerals, understanding their characteristics and how they can be identified. (Understanding)

CO3: Comprehend the composition and types of magma, as well as the rock cycle and properties of igneous rocks.(Understanding)

CO4: Understand the formation and classification of sedimentary and metamorphic rocks, gaining knowledge of their types and characteristics.(Understanding)

CO5: Develop an understanding of different rock structures and their mechanisms.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (IInd Year)

Course Name: Petrology

Course Code: 211-I

Course Outcomes: -

CO1: The student will gain and understand the knowledge about the processes of formation of rocks.

CO2: The student will gain and analyze the knowledge of the forms, structures and textures of the rocks.

CO3: The student will gain knowledge about the classification of rocks and evaluate the origin of the rocks.

CO4: The student will be able to identify common Igneous, Sedimentary and Metamorphic rocks using hand specimens and also under microscope they can use their practical knowledge in the field.

CO5: The student can create own model of the paragenesis will also learn about the different types of map symbols used to show different rock types on map.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (IInd Year)

Course Name: Structural Geology

Course Code: 211-II

Course Outcomes: -

CO1: Identification and measurements of structures is fundamental to geological mapping The student will gain knowledge of the geometry of the rock structures and will be able to identify structures and will be able to use Clinometer Compass for measurements of structures.

CO2: The student will gain knowledge of the geometry of the rock structures, understand the mechanism of the evolution of rock structures and its application in the field.

CO3: This course also helps to learn how to interpret geological maps, and how to relate outcrops patters with topography and structure.

CO4: Students will learn how to use structures and help students appreciate the dynamic nature of the Earth

CO5: Students will be able to interpret and write the geological history from geological maps.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (IIIrd Year)

Course Name: Palaeontology and Stratigraphy

Course Code: 311-I

Course Outcomes: -

CO1: The student will gain knowledge about fossils and fossilisation and able to illustrate the morphology of various groups of invertibrate fossils and plant fossils.

CO2: Will able to articulate the importance of fossils in establishing age of rock units, stratigraphic correlation and apply knowledge in hydrcarbon exploration.

CO3: Student will able to connect diverse geology of India with standard geological time scale and use knowledge to explain the framework of Stratigaphy of India.

CO4: Be able to decipher the geological history of an area from a geological map. Develop ability to correlate the geological age and significance of depositional sequences.

CO5: Students will gain knowledge and able relate the economic mineral deposits and fossil content associated with various stratigraphic units of India.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: B.Sc. (IIIrd Year)

Course Name: Earth resources and Applied Geology

Course Code: 311-II

Course Outcomes: -

CO1: The student will gain knowledge about earth resources and understand and illustrate primary and secondary processes of mineral formation and be able to correlate with Indian mineral deposits.

CO2: Student will learn about origin, mode of occurrence, grade and specification of ores and industrial minerals of India and able to categories minerals resources accordingly. The student will able to correlate Geology of India with associated mineral wealth of our country and state.

CO3: Ability to understand and illustrate geology and othervarious aspects of fossil fuels and atomic mineral deposits of the India. Alsolearn to gain knowledge about mineral economics.

CO4: Student will able to relate and apply the various aspects of Geological knowledge in the field of prospecting, exploration and exploitaion of minerals. Able to understand the mineral beneficiation processes.

CO5: Student will gain knowledge about the groundwater geology. Be able to apply geological knowledge in geological investigations related to civil enginnering projects and be understand to use GIS and remote sensing techniques in geological studies.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Geodynamics

Course Code: - G-11

Course Outcomes: -

CO1: The student will gain knowledge about the origin and age of the earth. The student will also gain knowledge about the dynamic nature of the earth.

CO2: The student will gain knowledge of the interior of the earth and the natural phenomenon of volcanism and earthquakes.

CO3: The student will be able to judge the probability and severity of the seismic hazard in India.

CO4: The student will also gain knowledge about the present and past magnetic properties of the earth.

CO5: The student will be able to relate the occurrence and distribution of volcanoes and earthquakes with various plate boundaries. They will be able to correlate the global topographic features with the palate tectonic activities.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Structural Geology

Course Code: G-12

Course Outcomes: -

CO1: The student will gain knowledge of the geometry of the rock structures and will be able to identify structures and will be able to use Brunton Compass and Clinometer Compass for measurements of structures.

CO2: They will be able to apply and use the fundamental knowledge of primary structures to solve the field problems of structural geology.

CO3: The student will gain knowledge of the geometry of the rock structures, understand the mechanism of the evolution of rock structures and will be able to apply it in the field and will be able to identify and classify the various structures in the field.

CO4: Identification of measurement of structures is fundamental to geological mapping. This course will help to develop understanding of geological maps. They learn how to interpret geological maps, and how to relate outcrops patters with topography and structure. They will be able to solve the problems of structural geology using various laboratory and field techniques.

CO5: The course also helps to know how to use structures and help students appreciate the dynamic nature of the earth.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Indian Stratigraphy

Course Code: G-13

Course Outcomes: -

CO1: Be able to classify rocks in geological sequences in lithostratigraphic units and able to relate them in chronostratigraphic divisions of geological time scale.

CO2: Be able to learn and categories the Precambrian Geology, tectonics and associated economic mineral resources of Archaeans of south, centeral, eastern and northwestern part of India and also able to classify and categories the geology of Proterozoic basins and associated mineral resources

CO3: Able to understand about the major boundaries in geological time scale and articulate the events related to the boundaries. Be able to classify the Indian stratigraphy of Lower and Upper Paleozoic era including stratigraphy and fossils of Lower palaeozoics of extra peninsula.

CO4: Be able to understand and correlate the Paleoclimate, plant fossils, stratigraphy, geographic distribution and coal deposits of Gondwana supergroup (Permo carboniferous period)

CO6: Gain knowledge and classify the Indian stratigraphy of Mesozoic era includes Ccretaceous and Jurassic rocks of India, associated fossils and mineral resources. Be able to understand and classify the stratigraphy of Cenozoic Era including Deccan volcanic episode, Tertiary rocks, fossils and associated hydrocarbons of northeast India. Be able to correlate and illustrate the Siwalik Stratigraphy the associated mammal fossils,

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Mineralogy and Geochemistry

Course Code: G-14

Course Outcomes: -

CO1: Students will gain knowledge and understand about the physical properties of Metallic and Non-metallic minerals which help to relate and apply in mineral search in the field. Students will Categories and will able classify minerals in Schemes related to Mineralogists and Economic geologists.

CO2: With the help of Classification and Mineralogical properties of various Mineral Groups. Students will able to Categories and illustrate theoretical and practical aspects of these Rock-forming mineral groups including Gemstones and also able to apply knowledge in mineral search in the field

CO3: With the help of various Principles of Optics, students can learn and able to classify the Rock-forming minerals in Optical Classification. Knowledge of optical properties of minerals, make enable students to identify, judge and articulate minerals under polarizing microscope.

CO4: Students will gain knowledge and can illustrate some of the more important Optical properties of minerals which ultimately set the students mind towards research in future.

CO5: Geochemistry play vital role in understanding the Geochemical processes of our planet. Study of Meteorites and other terrestrial materials help in understanding the Cosmic nature of our Solar System and Universe. Study of radioactive isotopes help in interpreting and determining the age of rocks.

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Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Geomorphology

Course Code: G-21

Course Outcomes: -

CO1: Student will be able to understand the historical perspective and development of geomorphology, i.e., the study of landforms.

CO2: Student will the learn about the various geomorphic processes that shape the landforms present around us.

CO3: Students will learn to identify and classify the landforms and will be able to understand the origin and evolution of landforms.

CO4: Students will gain knowledge of different types of landforms of India. CO5: Students will learn to perform drainage basin analysis. They will be able to measure the various aspects of drainage basin. Student will also learn to relate the Geomorphology to various other fields of geology

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Igneous and Metamorphic Petrology

Course Code: – G-22

Course Outcomes: -

CO1: The course deals with various aspects like origin of magma and composition structures, textures and forms of rocks.

CO2: The student will gain knowledge of various rocks (igneous, sedimentary and metamorphic). Will be able to study rocks under microscope as well as in hand specimens.

CO3: The student will gain knowledge of the farms, texture, structures and interpretation of crystallisation. It's important in the field studies.

CO4: Students will get field knowledge of igneous, sedimentary and metamorphic rocks. Petrological studies also deal with petrochemical calculations and crystallization history.

CO5: These courses help to know the various rocks, types mode of occurrences and petrogenatic significance.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Sedimentology

Course Code: G-23

Course Outcomes: -

CO1: Students will gain knowledge about the Processes of Sedimentation. They will understand about origin of Sediments and Lithification and Diagenesis. Gain knowledge about classification and nomenclature of the common sediments and Classification of Sedimentary rocks.

CO2: Student will understand about Origin, classification and significance of primary, secondary and organic sedimentary structures and understand Classification of Sandstone Limestone and Dolomite. Be able to understand significance of sedimentary structures in paleocurrent studies.

CO3: Student will understand and gain knowledge about Textures of sedimentary rocks and their genetic significance. Granulometric analyses of clastic particles, data and interpretation of nature of sediments.

CO4: Student will understand and gain knowledge about elements and types of depositional environments: Continental transitional and marine environments.

CO5: Student will gain knowledge regarding Provenance and mineral stability, Concept and types of sedimentary provenance. Separation and significance of heavy minerals. They will understand tectonic framework of sedimentation (Kay's classification of tectonic elements) and Cyclothem, Graphical representation of Sedimentary rocks and their Interpretation. Heavy mineral analysis of sediments and its interpretation.

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Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Geology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Paleobiology

Course Code: – G-24

Course Outcomes: -

CO1: The student will gain knowledge about the different aspects of fossils and fossilisation. Palaeobiolgy would enable the students to understand the appearance and evolution of life through the geologic time.

CO2: The student will gain knowledge about significance of fossil in establishing relative geological ages of rock units, stratigraphic correlations and classification as well as in palaeogeography and other geological studies.

CO3: Be able to learn and understand the morphological features, evolutionary trends and geological history and distribution of invertebrate, vertebrate, plant, and microfossils.

CO4: Study of invertebrate, vertebrate, plant, and microfossils enable students to identify and classify the fossils embedded in rock outcrops in the field.

CO5: The students will able to understand the Concept of micropalaeontology, and applications of microfossils in Fossil-fuel Exploration. Be able to learns Palaeo-botany and Palynology and characteristic features of Gondwana flora.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Economic Geology

Course Code: G-31

Course Outcomes: -

CO1: The student will gain knowledge and able to connect the different aspects of mineralising fluid, physical and chemical principles of mineral deposition.Be able to explain and categories primary processes of mineral deposits foramation

CO2: In-depth explanation is given to understand primary processes of formation of mineral deposit. Student will illustrate the form size, texture, structure and mineral and correlate them with assemblages of the genetic groups of minerals

CO3: Be able to gain knowledge about Origin, mode of occurrence, association, uses and Indian occurrences of the ores of important metallic minerals.

CO4: Be able to understand the origin, mode of occurrences, association and grades for mineral used in various mineral based industry includes cement, fertilizer and refractory. Be able to apply knowledge to setup mineral-based industries.

CO5: The students will gain knowledge and able to classify the fossil fuelsliquid and gaseous hydrocarbons and coal,Be able to Geology of productive coal and oil fields of India. Be able to know aboutall aspects of atomic minerals and their deposits in Indiaand Nuclear power stations of the country and future prospects.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Mineral Exploration

Course Code: – G-32

Course Outcomes: -

CO1: Student can learn proper mineralsampling me .thodWith the knowledge of Assay value calculation, Mineral reserve computation and Classification, student will able to appraise qualitative measurement, quantity determination etc. about the mineralization.

CO2: Student will able to understand the sequences of Mineral Exploration program. Student can learn and plan the Reconnaissance and Detailed geological mapping; Students also learn how such mineralization can be evaluated and prospected.

CO3: With the knowledge of geochemistry student will able to understand and plan the various methods of Geochemical exploration. CO4: Various Geophysical practices have proved indispensable for hidden mineral deposits and in the areas of scanty exposures. Student will able to relate and plan the latest Geophysical mineral exploration techniques.

CO5: After the study and interpretation of different Exploration techniques, finally Drilling investigations are carried out to delineate the subsurface mineral body. Student will gain knowledge and learn to categories and plan the various drilling methods.

CO6: By learning of contents of this course, student will be able to relate, valuate and plan the mineral search and exploration.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Photogeology and Remote Sensing

Course Code: G-33-A

Course Outcomes: -

CO1: The student will gain knowledge of the fundamental principles and techniques of Remote Sensing. They will be able to measure length, area and heights of the land features from the aerial photographs and satellite images.

CO2: Student will learn about the different types of Remote Sensing platforms and sensors.

CO3: Student will learn to interpret geology and distinguish various landforms and geological structures from the aerial photographs and satellite images. Will be able to create geological maps from remotely sensed data.

CO4: Student will also learn how to use the Remotely Sensed data for Mineral exploration and Groundwater exploration.

CO5: Student will also learn how to use the Remotely Sensed data for preparing Landuse and Landcover maps.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Computer Applications in Geology (Elective - 1)

Course Code: G-33-B

Course Outcomes: -

CO1: Student will learn about the fundamental concepts about computer and operating system.

CO2: Student will learn about the hardware and peripheral devices and also about the types of computer software.

CO3: Student will gain a general idea about programming languages, interpreters and compiler. He will also learn about popular operating system and will be able to perform

CO4: Student will learn the basics of computer programming using Visual Basic and C++ and Visual basic. The will be able to write small computer programmes.

CO5: Student will learn about the popular database management systems like Oracle and will also learn about the applications of computers in geological studies. The will be able to create contour maps and 3D views of the terrain.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Hydrogeology (Elective - 2)

Course Code: G-34-A

Course Outcomes: -

CO1: The student will gain knowledg about the hydrogeology and their various parameters. They will be able to explain the flow of surface and sub-surface water and how ground water get recharged and interacts with the surrounding soil and rocks.

CO2: Student will identify different hydrological properties of rocks and soils based on which they can plan and propose solution for water related problems and its management.

CO3: They will be able to critically analyse the quality and quantity of surface water and ground water as well as their availability in various purposes.

CO4: They will be able to implement different methods of artificial recharge of surface and groundwater to solve the problem of water scarcity in their surrounding areas.

CO5: Students will be able to recognise area specific main causes of water pollution, both

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Engineering Geology and Geotechniques (Elective - 2)

Course Code: – G-34-B

Course Outcomes: -

CO1: Student will understand and recognize the importance of geological studies in civil engineering projects.

CO2: They will be able to apply the knowledge of core branches geology for civil engineering projects.

CO3: Student will also learn how to systematically plan the geological investigations for site selection of civil engineering projects.

CO4: Student will be able to also learn the importance of seismic zoning and its relation to design of buildings and other engineering projects. They will be able to appraise the seismic status of the civil engineering sites.

CO5: Student will learn to evaluate the sites for construction of civil engineering projects.

CO6: They will about the various field and laboratory techniques used for investigations in engineering projects.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Ore Geology

Course Code: G-41

Course Outcomes: -

CO1: The student will gain understand and able to illustrate about the different aspects of ore genesis, geothermoberometry, paragensis and zoning and learns about metallogeneic provinces and epochs with special reference to India and able to prepare metallogeneic map of India.

CO2: Student will able to understand and illustrate secondary processes of formation of mineral deposits with relevant examples of Indian mineral deposits.

CO3: Study of ore microscopy enable to understand the concept of ore microscopy, ore textures and optical properties of ore minerals under reflected light and enable students to categories identify and illustrate ore minerals. Students will able to understand the application and significance of ore microscopy in ore genesis, ore beneficiation and can categories ore minerals.

CO4: Be able to understand, classify and illustrate origin, mode of occurrences, association, specification, grades of nonmetallic minerals used in various industries namely cement, fertilizer, abrasive, paint pigments, glass and refractory industry. Students will able to apply knowledge in setup of mineral based industries.

CO5: Study of mineral economics, national mineral policy and mineral concession rules enable students to understand that how minerals play vital role in economy of country. Student will learn and categories the minerals in defense and war in terms of strategic, critical and essential minerals. Students will understand and linking knowledge about the significance of minerals for economy of a country

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Applied Geology

Course Code: – G-42

Course Outcomes: -

CO1: Students will gain knowledge about the r Prospecting, Exploration, and able to evaluate Quality and Quantity of mineral deposits, Be able to understand exploitation and relate various open cast and underground mining methods.

CO2: Students canlearn various Coal mining methods, Underground Geological Mapping. Students will gain idea and able to categories and relate the different methods of mineral Dressing and able to connect stages of mineral Concentration.

CO3: Students get know about engineering properties of Rocks and Soil etc. Students also learn and able to articulate the proposed site for Engineering project. Able to relate and illustrate the lithology, topography, Structures, Environmental suitability and social viability of the project site.

CO4: Students will able to gain knowledge of Groundwater Geology, Hydrological properties of rocks and Groundwater Exploration techniques. Will also understand and relate Groundwater Provinces and Zones of India. Students will also able to correlate the Environmental and Geology.

CO5: Remote Sensing and GIS are the advanced tools used in most of the sectors including Geology. Students will gain Basic knowledge, advantages and limitations of Remote Sensing. GIS is integral part of Remote Sensing hence students can learn about GIS and popular GIS software's and able to plan and create maps.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Environmental Geology (Elective -3)

Course Code: G-43-A

Course Outcomes: -

CO1: Student learns and illustrate about various concepts of Environmental Geology and their scope and importance. Also gain knowledge about Global warming and environmental problems in India. CO2: Student able to understand and illustrate environmental impact of large dam, River water disputes, mining, soil and land degradation etc. on environment.

CO3: Student learns about Air, water and soil pollution and their environmental effects. They also understand and will able to classify natural hazards Earth quakes, volcanoes, floods, cyclones and Drought and their impact on environment.

CO4: Student learns how to manage and control various natural and human induced hazards. They also understand and able to apply knowledge about the solid waste and waste water management. CO5: Student learns about application of Remote Sensing and Geographical Information System (GIS) in environmental geology and will able to apply this knowledge in various environmental issues. Student will understand and illustrate about watershed management, waste land reclamation, land use pattern, Rain water Harvesting Techniques and different acts related to environmental protection and water pollution.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Mineral Processing and Technology

Course Code: G-43-B

Course Outcomes: -

CO1: The student will gain knowledge about the different aspects of mineral processing and mineral technology and able to understand and connect the significant physical and chemical characteristics of ore minerals and Industrial minerals which plays vital role in mineral processing.

CO2: The student will understand and illustrate terminology in mineral processing and mineral dressing processes like Liberation, Comminution, Crushing, Grinding, Sizing.

CO3: Be able to learn, categories and illustrate the various mineral separation Processes like Gravity concentration methods, tabling, jigging, heavy media separation, sedimentation, dewatering techniques.

CO4: The student will learn, categories and illustrate Forth Flotation, Magnetic separation and Electrostatic separation methods.

CO5: Be able to know, understand and prepare the Beneficiation flow sheets of Indian deposits like Coal, Copper, Lead-Zinc, Iron and Rock Phosphate.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Fuel Geology (Electivr-4)

Course Code: G-44

Course Outcomes: -

CO1: By the study of Coal, student will learn and correlate the Physical and Chemical properties of Coal, also able to understand and connect Coal Petrography and different theories related to Origin of Coal.

CO2: Students will learn to classify coal as Indian and International specifications. Preparation practices for Washing, Carbonization, Gasification, Hydrogenation, and Briquetting of Coal.

CO3: Study of surface and/or undergroundcoal minining method, students can also learn about mining procedure Students will also gain knowledge and plan about the coal prospecting and about the Coal Bed Methane.

CO4: Students will understand and illustrate the Origin, Migration and Accumulation of Liquid and Gaseous hydrocarbons. Students also learn and relate the Petroleum Geology of important Oil and Gas fields of India.

CO5: Students can learn about the Geology of Radioactive minerals and associated rock types. Methods of Exploration for new atomic mineral deposits. Able to relate Geology of existing atomic mineral deposits. Students will gain knowledge about nuclear power stations of India.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (Horticulture Major)

Course Name: Fundamentals of Horticulture (Major)

Course Code: S1-HOR1T

Course Outcomes: -

CO1: Define horticulture and describe its branches, scope, importance, history, present status, and problems. (Understanding)

CO2: Classify horticultural fruits and explain their significance in horticulture. (Understanding)

CO3: Differentiate between various types and classes of horticultural seeds and analyze their structures in dicot and monocot plants. (Analyzing)

CO4: Identify the characteristics of good quality seeds and evaluate methods for determining seed quality. (Evaluating)

CO5: Compare and contrast different seed sowing methods and irrigation systems used in horticulture.(Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (Horticulture Major)

Course Name: Horticulture Production ((Minor)

Course Code: S1-HOR2T

Course Outcomes: -

CO1. Define and explain the concept of high-tech horticulture production, highlighting its scope and importance in modern agriculture. (Understanding)

CO2. Describe the scope and importance of floriculture in the horticulture industry, emphasizing its role in the production of flowers for ornamental and commercial purposes. (Understanding)

CO3. Analyze the commercial production aspects of horticulture, including factors like market demand, cultivation techniques, and profitability. (Analyzing)

.**CO4**. Understand the post-harvesting practices in horticulture, emphasizing the importance of proper handling, storage, packaging, and transportation of horticultural products. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (Horticulture Major)

Course Name: Fundamentals of Horticulture (Open Elective)

Course Code: S1-HOR3T

Course Outcomes: -

CO1. Define horticulture and identify its branches, demonstrating understanding of the diverse areas encompassed by horticulture. (Understanding)

CO2. Gain enthusiasm and knowledge about the importance of DNA, RNA, vitamins, and lipids in biological systems. (Understanding)

CO3. Describe the characteristics of good quality seeds, recognizing the key attributes that contribute to their quality and viability. (Bloom's Level: Understanding)

CO4. Compare and contrast different seed sowing methods, demonstrating an understanding of the various techniques used in horticulture. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (Horticulture Major)

Course Name: Horticulture Production (Major)

Course Code: S2-HOR1T

Course Outcomes: -

CO1. Explain the concept of high-tech horticultural production and its significance in modern agriculture, demonstrating understanding of its key components and practices. (Understanding)

CO2. Analyze the scope and importance of floriculture, recognizing its role in the horticulture industry and its impact on ornamental plant production. (Analyzing)

CO3. Evaluate the commercial production aspects of horticulture, specifically in relation to propagation techniques and post-plantation care, demonstrating the ability to assess and make informed decisions. (Evaluating)

CO4. Examine post-harvesting technologies and their importance in maintaining product quality and shelf life, demonstrating understanding of key practices and methods. (Understanding)

CO5. Evaluate the entrepreneurial opportunities in horticulture, demonstrating an understanding of the business aspects and challenges involved in establishing and managing horticultural enterprises. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (Horticulture Major)

Course Name: Fundamentals of Horticulture (Minor)

Course Code: S2-HOR2T

Course Outcomes: -

CO1: Define horticulture and describe its branches, scope, importance, history, present status, and problems. (Understanding)

CO2: Classify horticultural fruits and explain their significance in horticulture. (Understanding)

CO3: understand the difference between various types and classes of horticultural seeds and analyze their structures in dicot and monocot plants. (Understanding)

CO4: Re call the characteristics of good quality seeds and evaluate methods for determining seed quality. (Remembering)

CO5: Compare and contrast different seed sowing methods and irrigation systems used in horticulture.(Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (Horticulture Major)

Course Name: Commercial Horticulture Production Technology

(Open Elective)

Course Code: S2-HOR3T

Course Outcomes: -

CO1. Define and explain the concept of high-tech horticulture production, highlighting its scope and importance in modern agriculture. (Understanding)

CO2. Describe the scope and importance of floriculture in the horticulture industry, emphasizing its role in the production of flowers for ornamental and commercial purposes. (Understanding)

CO3. Analyze the commercial production aspects of horticulture, including factors like market demand, cultivation techniques, and profitability. (Analyzing)

.**CO4**. Understand the post-harvesting practices in horticulture, emphasizing the importance of proper handling, storage, packaging, and transportation of horticultural products. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (IInd Year)

0turse Name: : Establishment and Management of Orchard and Nursery

Course Code: 212-I

Course Outcomes: -

CO1: Impart basic knowledge and skill development about the establishment and management of Orchard.

CO2: Understand the principles, theoretical aspects of Landscape designing, Ornamental gardening and Protected cultivation of horticultural crops.

CO3: Familiarize with principles and practices of propagation of nursery establishment and management.

CO4: Identify the practice of horticulture tools, common greenhouse design and the materials used to build them. CO5: Correlate weeds associated with different horticultural crops and their preventing and controlling measures.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (IInd Year)

Course Name: Farming Systems in Horticulture

Course Code: 212-II

Course Outcomes: -

CO1: Educate the importance of sustainable horticulture farming and various systems.

CO2: Illustrate basics about type of farming and their factors.

CO3: Compare the theory and practical aspects of cropping systems.

CO4: Collaborate and interact with farmers after taking knowledge of theory and practical aspects of different cropping systems.

CO5: Develop various resources of farm power, crop rotation and irrigation practices.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (IIIrd Year)

Course Name: Soil Productivity & Agro forestry

Course Code: 312-I

Course Outcomes: -

CO1: Explain the soil formation, composition, soil profile and soil properties.

CO2: Impart basic information about various causes of soil erosion and control measures.

CO3: Reframe the principles of soil fertility, soil conservation methods and type of soil water.

CO4: Understand essentiality of plant nutrients and method of fertilizer application.

CO5: Plan the practical aspects of agroforestry after taking knowledge of theory.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Programme Name: B.Sc. (IIIrd Year)

Course Name: Processing of Horticulture Crops & Value Addition

Course Code: 312-II

Course Outcomes: -

CO1: Understand the principles and methods of fruit preservation, postharvest loss and their control. CO2: Articulate principles of fruit and vegetable preservation along with post-harvest changes.

CO3: Establish food preservation industry after knowing economics, finance and marketing.

CO4: Reframe the theoretical aspects for skills development in biotechnology of horticultural crops. CO5: Harnessing tissue culture techniques in horticultural crops.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.Sc. (Mathematics Major)

Course Name: Algebra Vector Analysis and Geometry (Major)

Course Code: S1- MATH1T

Course Outcomes: -

CO1: Recognize and identify consistent and inconsistent systems of linear equations by applying row echelon form to the augmented matrix. (Remembering)

CO2: Understand the geometric interpretation and applications of eigenvalues and eigenvectors in linear transformations and systems of equations. (Understanding)

CO3: . Apply vector calculus principles, including gradient, divergence, and curl, to solve problems in geometry. (Applying)

CO4: Analyze and interpret three-dimensional geometrical figures, such as cones and cylinders, understanding their properties and characteristics. (Analyzing)

CO5: Apply critical thinking and problem-solving skills to design innovative solutions. (Creating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.Sc. (Mathematics Major)

Course Name: Calculus and Differential Equation (Minor)

Course Code: S1- MATH 2T

Course Outcomes: -

CO1. Apply mathematical properties to sketch and analyze curves in different coordinate systems. (Understanding)

CO2. Utilize derivatives in optimization, social sciences, physics, and life sciences. (Understanding)

CO3. Formulate differential equations for mathematical models.

. (Understanding)

CO4. Identify and analyze various types of organic reactions, such as substitution, addition, elimination, and oxidation-reduction reactions, and understand their mechanisms and the factors that influence their outcomes. (Understanding)

CO5. Solve and analyze mathematical models using various techniques. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.Sc. (Mathematics Major)

Course Name : Mathematics Logic and Sets (Open Elective)

Course Code: S1- MATH 3T

Course Outcomes: -

CO1 Apply principles of logic to evaluate reasoning validity in everyday discourse.(Understanding)

CO2 Construct truth tables and test logical equivalence of statements. Use predicate language for mathematical statements..(Understanding)

CO3. Utilize set theoretical concepts and thinking processes in problem-solving. Apply appropriate tools and techniques.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.Sc. (Mathematics Major)

Course Name: Calculus and Differential Equation (Major)

Course Code: S2- MATH 1T

Course Outcomes: -

CO1. Sketch curves in a plane using mathematical properties and different coordinate systems. (Understanding)

CO2. Apply the derivative in optimization, social sciences, physics, and life sciences. (Applying)

CO3. Formulate differential equations for various mathematical models. (Applying)

CO4. Use techniques to solve and analyze mathematical models. (Analyzing)

CO5 Analyze the behavior and properties of mathematical models using graphical representations and numerical methods. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.Sc. (Mathematics Major)

Course Name: Algebra Vector Analysis and Geometry (Minor)

Course Code: S2- MATH 2T

Course Outcomes: -

CO1. Identify consistent and inconsistent systems of linear equations using row echelon form and matrix rank.(Remembering)

CO2 Determine the eigenvalues and corresponding eigenvectors of a square matrix.(Understanding)

CO3. Apply vector calculus principles to solve geometric problems.(Understanding)

CO4. Gain a deeper understanding of three-dimensional geometric figures, such as cones and cylinders.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.Sc. (Mathematics Major)

Course Name: Matrices,Geometry and Vector Algebra

(Open Elective)

Course Code: S2- MATH 3T

Course Outcomes: -

CO1: Apply matrices, determinants, and geometric concepts to solve problems in business and science, such as budgeting, sales projection, and cost estimation.(Remembering)

CO2: Utilize vector approaches to analyze experimental results and make data-driven decisions in various fields, including business and science. (Understanding)

CO3: Apply the principles of geometry to solve practical problems and make informed decisions in areas such as business and science..(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.SC (IInd Year)

Course Name: Abstract Algebra

Course Code: 214 - I

Course Outcomes: -

CO1: Recognize the mathematical objects called groups. This partprovides a foundation in the basic concepts in the groups, subgroups and cyclic groups including properties.

CO2: Explain the significance of the notions of cosets, Lagrange's theorem and its consequences, normal subgroup and factor group.

CO3: Learn about structure preserving maps between groups namely homomorphism, isomorphism and its consequences, Permutationgroups.

CO4: Utilize the class equation and Cauchy, sylow's theorems to solverelated problems.

CO5: Provide information on rings, ideal and quotient ring, Integraldomain and Euclidean ring.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.SC (IInd Year)

Course Name: Advanced Calculus

Course Code: : 214 - II

Course Outcomes: -

CO1: Evaluate the limits of indeterminate forms, describe the concept of the convergence of sequences and series of real numbers.

CO2: Analyze the concept of continuity and differentiability of functions of a singlevariable and several important results. CO3: Categorize the limit and continuity of functions of two variables, partialdifferentiation, Taylor's theorem and Jacobeans.

CO4: Evaluate maxima and minima of functions of two variables, envelopes and evaluates, and get the knowledge of two very important functions namely beta andgamma functions.

CO5: Describe and evaluate the volumes and surfaces of the solids of revolutions.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.SC (IInd Year)

Course Name: Differential Equations

Course Code: 214 - III

Course Outcomes: -

CO1: Identify the various second order differential equations namely Bessel's and Legendre'sequations using the power series method.

CO2: Understand the applications of Laplace transform and able to solve ordinary differential equations.

CO3: Apply the inverse Laplace transform to solve the linear differential equations.

CO4: Solve PDE of first order using Lagrange's method, Charpits method and categorized PDE into standard forms.

CO5: Solve PDE (homogeneous and non - homogeneous) of second and higher order with constant coefficients.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.SC (IIIrd Year)

Course Name: Linear Algebra and Numerical Analysis

Course Code: 314 - I

Course Outcomes: -

CO1: Generalize the concept of a real (complex) vector space to an arbitrary finite dimensional vector space, determine whether a subset of a vector space is linearly dependent and describe the concept of a basis for a vector space.

CO2: Investigate the properties of vector spaces and subspaces using by linear transformation, express linear transformation between vector spaces, represent linear transformations by matrices, describe the concepts of Eigen values and Eigen vectors, determine whether a linear transformation is diagonalizable or not.

CO3: Determine the angle between vectors and orthogonality of vectors, Explain Gram - Schmidt orthonormalization process, compute the orthogonal projection of a vector onto a subspace.

CO4: Discuss various iteration methods to solve the problems through various methods, Lagrange interpolation, Newton - Cote's and Gaussquadrature formulae.

CO5: Understand the various direct and iterative methods of solution of linear equations.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.SC (IIIrd Year)

Course Name: Real and Complex Analysis

Course Code: 314 - II

Course Outcomes: -

CO1: Understand Riemann sums and integral, fundamental theorem of calculus, mean valuetheorems in integral calculus, Schwartz's , Young 's implicit function theorems.

CO2: Understand first and second type of improper integrals and its convergence anddivergence, and various integral tests, Fourier series.

CO3: Understand the notion of metric space and its preliminaries, Cauchy sequence, completeness and Banach contraction principle. Baire category theorem.

CO4: Discuss the continuity, uniform continuity and their results, compactness and connectedness of space.

CO5: Explain The notion of complex numbers and, its limit and continuity, analytic function, C. R.equations, Mobius transformations, cross ratio.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: B.SC (IIIrd Year)

Course Name: Discrete Mathematics

Course Code: : 314 - III

Course Outcomes: -

CO1: Understand the disjunctive and conjunctive normal form of a Boolean function,equivalence relation and partition of sets.

CO2: Understand the posets, lattices and various types of lattices with examples.

CO3: Understand the concept of graphs like connected, Euler, etc Hamiltonian path and circuits and algorithms for path.

CO4: Understand trees and its type, rank and nullity of a graph.

CO5: Understand the matrix representation of a graph, planar graph and its properties.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (ISt Sem.)

Course Name: Advanced Abstract Algebra – I

Course Code: M - 11

Course Outcomes: -

CO1: Classify normal,subnormal and composite series, Discuss the Jordan - Holder's theorem,solvable and nilpotent groups.

CO2: Describe algebraic and transcendental extension of fields, Eisenstein criterion ofirreducibility and algebraically closed fields.

CO3: Explain normal and separable extension along with finite field, separable andinseparable extensions.

CO4: Discuss the fundamental theorems of Galois theory and algebra.

CO5: Explain the applications of Galois theory, roots of unity polynomial solvable byradicals.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (ISt Sem.)

Course Name: Real Analysis

Course Code: M- 12

Course Outcomes: -

CO1: Understand integrals and its properties, fundamental theorem of calculus.

CO2: Know integration of vector valued functions, and Riemann's theorem.

CO3: Develop the knowledge of sequence and series of functions, Riemann - Stieltjesintegration and power series, Different tests.

CO4: Know about functions of several variables, linear transformations, Taylor's theorem,inverse function theorem.

CO5: Explain implicit function theorem, Jacobians, Differential of integral, Stoke's theorem.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (ISt Sem.)

Course Name: Topology - I

Course Code: M - 13

Course Outcomes: -

CO1: Categorize countable and uncountable sets and understand the cardinality and its arithmetic, including Schroeder - Berstein and Cantor's theorem.

CO2: Understand the Basic notions of topological space and its properties, relative topology.

CO3: Understand the continuity and homeomorphism in a various topological space.

CO4: To compare the first and second countable space and related results.

CO5: Discuss connected and path connected spaces including component of topologicalspaces.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (ISt Sem.)

Course Name: Complex Analysis I

Course Code: M - 14

Course Outcomes: -

CO1: Understand various theorems and formulae of Cauchy, Goursat, Poission etc.

CO2: Discuss the applications of Cauchy's theorem and integral formula, Morera's, Liouville's, Taylor's and Laurent's theorems.

CO3: Understand the maximum modulus principle, Schwarz's lemma, zeros andsingularity of analytic function and related results.

CO4: Utilize the Cauchy's residue theorem and its applications.

CO5: Understand the notion of elementary transformations, conformal Mappings.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (ISt Sem.)

Course Name: Advanced Discrete Mathematics - I

Course Code: M - 15

Course Outcomes: -

CO1: Understand the theory of semi-groups, various structures of semigroups, homomorphism of semi-groups and direct product.

CO2: Understand lattices and its properties, direct product, some special lattices e.g., complimented and distributive etc.

CO3 : Discuss Boolean algebra, various Boolean forms, Boolean functions and types,applications of Boolean algebra.

CO4 : Understand the elementary concepts of Graph theory along with planar graph and its properties, trees.

CO5 : Discuss Euler's formula for connected planar graphs, special trees and its uses,Kruskal's algorithm'.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IInd Sem.)

Course Name: Advanced Abstract Algebra - II

Course Code: M - 21

Course Outcomes: -

CO1: Explain the concept of modules, submodules, direct sums, cyclic and quotientmodules, along with homomorphism

CO2: Understand completely reducible modules, free modules, linear mapping and its rank.

CO3: Discuss Noetherian and Artinian modules and rings, Hilbert's and Wedderburn's theorem.

CO4: Illustrate the uniform, primary and finitely generated modules over a PID and applications to finitely generated abelian groups.

CO5: Understand the concepts of linear transformation and its algebra and apply it to canonical and triangular forms, generalized Jordan form.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IInd Sem.)

Course Name: Lebesgue Measure and Integration

Course Code: M – 22

Course Outcomes: -

CO1: Understand Lebesgue outer measure, Measurable sets, Regularity, Measurable functionsand non-Measurable sets.

CO2: Define integration of non-negative functions, integration of series, Riemannintegrations.

CO3: Get an idea of the four derivatives, functions of bounded variation, differentiation andintegration,

CO4: Know about spaces, convex functions, Jensen's, Holder's and Minkowski's inequality.

CO5: Understand about dual spaces, convergence in measure. Uniform convergence andalmost uniform convergence.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IInd Sem.)

Course Name: Topology - II

Course Code: M - 23

Course Outcomes: -

CO1: Categorize the separation axioms and inter-relationship, distinguish Urysohn's Lemmaand the Tietze extension theorem.

CO2: Illustrate various compactness like countably compact, sequentially compact, local compact in a metric and topological spaces.

CO3: Describe and classify the arbitrary product of different topological spaces and Tychonoff's theorem.

CO4: Discuss net and filters and their properties and results.

CO5: Compare the homotopy and path homotopy, fundamental group and fundamental theorem of algebra.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IInd Sem.)

Course Name: Complex analysis - II

Course Code: M - 24

Course Outcomes: -

CO1: Understand the space of continuation function and its space, Arzela - Ascoli,Hurwitz's, Montel and Riemann mapping theorems.

CO2: Understand the notion of inner product, Gamma function and properties, Riemann zetafunction, Runge's, Mittag - Leffler's theorems.

CO3: Utilize entire function and its order, Jensen's inequality and formula, Hadamardfactorization and three circle theorems, Borel's theorems.

CO4: Understand the analytic continuation function its uniqueness and power series method,Schwarz principle etc.

CO5: Study the Harmonic function and related theorems as Bloch's, Little Picard, Montei –Caratheodory, Great Picard theorems etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IInd Sem.)

Course Name: Advanced Discrete Mathematics - II

Course Code: M - 25

Course Outcomes: -

CO1: Understand the elementary concepts of graph theory and the properties of trees. Dijkstra's and Washell's algorithms.

CO2: Understanding finite state machines and its functioning and equivalence, finite automata.

CO3: To study the non - deterministic finite automata and its equivalence along with Moore and Mealy machines.

CO4: Understand Turing machine, grammar and Language, derivations.

CO5: To utilize the sentential form, context free and sensitive grammar and languages, regular expressions, polish notations.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IIIrd Sem.)

Course Name: Functional Analysis – I

Course Code: M - 31

Course Outcomes: -

CO1: Develop the idea of the normed linear space, Banach space and their properties.

CO2: Connect and interpret inite dimensional normed linear spaces and its properties along with the Riesz lemma.

CO3: Explain the quotient space of a normed linear space, Develop the idea of linear operators withproperties.

CO4: Understand and evaluate the bounded and continuous linear operators.

CO5: Analyze and evaluate the theory of bounded linear functional and dual spaces.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IIIrd Sem.)

Course Name: Advanced Special Functions-I

Course Code: M - 32

Course Outcomes: -

CO1: Understand Euler constant, the Euler product, Weierstrass definition of Gamma function, beta function, fractional function, Legendre and Gauss multiplication formula.

CO2: Discuss knowledge of hyper geometric function, integral representation of hyper geometric function, the contiguous function relations etc.

CO3: Understand and generalized hyper geometric functions, the exponential and binomial

CO4: Get an idea of Bessel function, index half an odd integer, Bessel's d Taylor's differential equation.

CO5: Discuss the confluent hyper geometric function, Kummer's formulae,orthogonal polynomials, expansion of polynomials.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IIIrd Sem.)

Course Name: Advanced Fuzzy Mathematics-I

Course Code: M - 33

Course Outcomes: -

CO1: Define a Fuzzy set membership function, representation of member function, support,height equality of two Fuzzy sets.

CO2: Get an idea of union and intersection of two Fuzzy sets, compliment of Fuzzy sets, Normal Fuzzy sets, Fuzzy cardinality. CO3: Understand important operation in Fuzzy product of two Fuzzy sets, Power of Fuzzysets, difference of two Fuzzy sets.

CO4: Development and understanding general properties of operations and Fuzzy sets,Important theorem in Fuzzy sets.

CO5: Know about comparison of α - cut and strong α - cut of compliment of Fuzzy sets.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IIIrd Sem.)

Course Name: Operations Research - I

Course Code: M - 34

Course Outcomes: -

CO1: To understand operations research origin development and characteristics.

CO2: Explain Various models of operations research. Linear programming, mathematicalformulations. CO3: Explain Methods for linear programming.

CO4: Solve by simplex method. Big M, two phase method.

CO5: Understand Duality and its characteristics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IIIrd Sem.)

Course Name: Analytic Number Theory - I

Course Code: M - 35

Course Outcomes: -

CO1: Precisely define several arithmetical functions and explain their divisors sums, multiplication and properties. CO2: Define and explain the Characters of a group, group of characters and the orthogonality relations for characters.

CO3: Define and discuss Dirichlet characters, sums involving Dirichlet's characters, non - vanishing Dirichlet L-function.

CO4: Explain the proof of Dirichlet's theorem on primes in arithmetic progressions.

CO5: Understand the concept of Dirichlet series and its absolute convergence, multiplication of two Dirichlet series and Euler's products using analytic version of fundamental theorem on arithmetic.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IVth Sem.)

Course Name: Functional Analysis - II

Course Code: M - 41

Course Outcomes: -

CO1: Get the knowledge of the facts and idea of uniform boundedness theorem, open mapping theorem and its applications,closed graph theorem and analyze and illustrate the applications.

CO2: Apply and interpret and utilize Hahn - Banach theorem for real and complex normed linear spaces.

CO3: Analyze, describe and discuss reflexive and Hilbert spaces with properties, orthonormal sets, Parsval's and Bessel's inequality.

CO4: Describe and discuss the projection mapping, projection and Riesz representation theorems.

CO5: Evaluate, apply and illustrate the adjoint of operator and reflexivity in Hilbert space, and variety ofoperators.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IVth Sem.)

Course Name: Advanced Special Functions – II

Course Code: M - 42

Course Outcomes: -

CO1: Get an idea of the generating function concept, another class of generating functions,properties of many polynomial sets.

CO2: Understand Legender's polynomials, Bateman's generating functions, hyper geometricform of Legender's polynomials, special properties of Legender's polynomials.

CO3: Get knowledge of Hermite polynomials, expansion of polynomials, more generating functions, recurrence relations. CO4: Understand Laguree polynomials, generating functions, recurrence Relations, expansionof polynomials, special properties of Leguree polynomials.

CO5: Get an idea of Jacobi polynomials, Bateman's generating function, The Rodriguesformula, orthogonality, mixed relations.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IVth Sem.)

Course Name: Advanced Fuzzy Mathematics - II

Course Code: M - 43

Course Outcomes: -

CO1: Define convex Fuzzy sets, types of Fuzzy sets. Further operation on Fuzzy sets,Cartesian product, Algebraic product.

CO2: Understand extension principle and application image, inverse image of Fuzzy sets,product and division of Fuzzy numbers.

CO3: Apply Fuzzy relation on Fuzzy sets. The union and intersection of Fuzzy sets.

CO4: Understand about Fuzzy graph, Fuzzy subgraph, path of Fuzzy Graph, Fuzzy functionon Fuzzy sets, Fuzzy function. CO5: Develop knowledge of Fuzzy logic, its connective. Tautologies Contradiction. Logical connective for Fuzzy logic. Linguistic hedges Fuzzy quantifiers.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IVth Sem.)

Course Name: Operations Research – II

Course Code: M - 44

Course Outcomes: -

CO1: Solve replacement problems Money value present worth fractional Discount ratio.

CO2: Solve assignment problem mathematical formulation.

CO3: Understand and solve transformations problems Northwest corner method Least costmethod.

CO4: To learn network analysis construction of network technique and advances of thenetwork.

CO5: To develop an idea for Game theory Solution by Linear programming Non-Linear programming technique.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Mathematics

Programme Name: M.SC (IVth Sem.)

Course Name: Analytic Number Theory - II

Course Code: M - 45

Course Outcomes: -

CO1: Describe the absolute and conditional convergence of the Dirichlet series and apply some important results on different Dirichlet series also to analyze the analytic properties of Dirichlet series.

CO2: Evaluate Dirichlet series as an exponential of Dirichlet series also to apply some important theorems on different Dirichlet series.

CO3: Define and discuss Hurwitz zeta Functions and its integral representation.

CO4: Explain the proof of theorems based on contour integral representation of Hurwitz zeta functions and its analytic continuation.

CO5: Apply Hurwitz formula for finding functional equations for Riemann zeta functions and Hurwitz zeta functions. To define and describe the properties of Bernoulli Polynomials and Bernoulli numbers and their properties also to analyze their applications in different fields of mathematics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: B.Sc. (Microbiology Major)

Course Name: General microbiology and Cell structure (Major)

Course Code: S1-MICRO1T

Course Outcomes: -

CO1: Recall and list key elements of Indian traditional knowledge and historical background related to microbiology.(Remembering)

CO2: Explain the structure of viruses and analyze their modes of transmission. (Understanding)

CO3: . Describe the cell structure and organization of bacteria and compare them to other types of microorganisms.(Applying)

CO4: Classify different types of unicellular prokaryotic and eukaryotic microorganisms based on specific characteristics. (Analyzing)

CO5: Evaluate the general characteristics of important Eubacteria and assess their significance in various microbiological contexts.(Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: B.Sc. (Microbiology Major)

Course Name: Microbiological Tools and Techniques (Minor)

Course Code: S1-MICRO2T

Course Outcomes: -

CO1. Recall and identify the basic lab glassware commonly used in a laboratory. (Remembering)

CO2. Explain the different methods of sterilization and isolation of pure cultures. (Understanding)

CO3. Recall and identify the basic lab glassware commonly used in a laboratory. (Remembering)

CO4. Explain the different methods of sterilization and isolation of pure cultures.(Understanding)

CO5. Demonstrate the application of serial dilution techniques to isolate bacteria.(Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: B.Sc. (Microbiology Major)

Course Name: Instrumentations in Microbiology (Open Elective)

Course Code: S1-MICRO3T

Course Outcomes: -

CO1. Acquire basic knowledge of glassware, microscopes, and instruments commonly used in microbiology laboratories.(Understanding)

CO2. Understand the process of autoclaving, cleaning, and sterilizing glassware for maintaining aseptic conditions. (Understanding)

CO3. Develop proficiency in handling various laboratory instruments utilized in microbiology experiments and analyses. (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: B.Sc. (Microbiology Major)

Course Name: Microbiological Tools and Techniques (Major)

Course Code: S2-MICRO1T

Course Outcomes: -

CO1. Recall and identify the basic lab glassware commonly used in a laboratory.(Remembering)

CO12. Summarize and compare different methods of sterilization and isolation of pure cultures.(Understanding)

CO3. Understand and explain the working principles of different kinds of instruments and microscopes used in microbiology.(Applying)

CO4. Apply serial dilution techniques to isolate bacteria and determine viable cell counts.(Analyzing)

CO5. Practice and demonstrate various methods to culture bacteria in a laboratory, including aseptic techniques and media preparation. (Evaluating)

CO5. Illustrate and perform a method to differentiate between Gram-positive and Gram-negative bacteria, such as the Gram staining technique.(Creating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: B.Sc. (Microbiology Major)

Course Name: General microbiology and Cell structure (Minor)

Course Code: S2-MICRO2T

Course Outcomes: -

CO1. Recall and describe the Indian traditional knowledge and historical background of microbiology.(Remembering

CO2. Explain the structure of viruses and how they are transmitted.(Understanding)

CO3. Describe the cell structure and organization of bacteria.(Applying)

CO4. Recall and describe different types of unicellular prokaryotic and eukaryotic microorganisms based on specific characteristics.(Remembering)

CO5. Explain the general characteristics of important Eubacteria and their significance in various microbiological contexts.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: B.Sc. (Microbiology Major)

Course Name: Laboratory Technique in Microbiology

(Open Elective)

Course Code: S2-MICRO3T

Course Outcomes: -

CO1: Recall and explain the basic knowledge of staining methods used in microbiology.(Remembering)

CO2: Describe the process of media preparation for cultivating microorganisms in the laboratory.(Understanding)

CO3: Demonstrate comprehension of the techniques involved in the isolation and maintenance of microbial cultures.(Understanding)

CO4: Compare and contrast different staining methods used in microbiology based on their applications and advantages.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: B.Sc. (IInd Year)

Course Name: Biochemistry and Microbial Physiology

Course Code: 215-I

Course Outcomes: -

CO1: Students will learn properties, classification and functions of carbohydrates, lipids, proteins and amino acids.

CO2: Students will study about growth of microbes and their measurement along with factors involved. CO3: Understand the various metabolic pathways related to microorganism.

CO4: Understand the transport mechanism, microbial biosynthesis process.

CO5: Understand the principle of bioenergetics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Microbiology

Programme Name: B.Sc. (IInd Year)

Course Name: Microbial Genetics and Molecular Biology

Course Code: 215-II

Course Outcomes: -

CO1: Students will study and learn about structure and function of DNA and RNA.

CO2: Understand the mechanism of DNA replication in living cell.

CO3: Understand the process of transcription and translation in prokaryotes and eukaryotes and basics of operon concept.

CO4: Importance of transformation techniques in genetic engineering.

CO5: Understand the mechanism of DNA mutation and repair systems.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Microbiology

Programme Name: B.Sc. (IInd Year)

Course Name: Applied and Environmental Microbiology

Course Code : 315-I

Course Outcomes: -

CO1: Students will study and learn the basic design and types of fermentor. Comprehend with techniques of strain improvement and immobilization

CO2: Learning about food spoilage, basic and advanced methods of food preservation.

CO3: Understand the role of microbes as biofertilizer to increase fertility of soil and production of SCP.

CO4: Learning about physiological adaptation in microbes and microbial interaction.

CO5: Understand the basic concept of bioleaching and bioremediation. Role of microbes sewage treatment plant.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Microbiology

Programme Name: B.Sc. (IInd Year)

Course Name: Immunology and Medical Microbiology

Course Code: 315-II

Course Outcomes: -

CO1: Studying and learning about cells and organs in immune system, innate and acquired immunity.

CO2: Understand the basic concept of antigen antibody interaction and immunoassays.

CO3: Understand the basic concept of origin and development of tumour cells and the role of nanoparticles in drug delivery system.

CO4: Learning about immunization schedule and medical importance of blood group.

CO5: Comprehend with laboratory techniques used in diagnosis of microbial infections.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Bacteriology

Course Code: MB-11

Course Outcomes: -

CO1: Students will study and learn to identify the basic structure of bacteria.

CO2: Students will study and learn about the growth phases of bacteria.

CO3: Students will study and learn the methods of cultivation of bacteria.

CO4: Understand the Chemical and physical control methods for bacteria.

CO5: Understand various staining techniques for bacterial structure.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Virology, Mycology and Phycology

Course Code: MB-12

Course Outcomes: -

CO1: Understand the basic idea of structure of viruses.

CO2: Students will study the life cycle of bacteriophage.

CO3: Understand the concept of cultivation of virus and quantification.

CO4: Learn basic concept and general characters of fungi with classification.

CO5: Understand the basic characters of Algae and its cultivation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Immunology

Course Code: MB-13

Course Outcomes: -

CO1: Gain knowledge about the various methods of vaccine productions.

CO2: Study the mechanism of antibody generation and role of immunoglobulins in immunity.

CO3: Articulate various immunological techniques.

CO4: Understand the mechanism, diagnosis and treatment of Cancer.

CO5: Understand the mechanism of development of hypersensitivity reactions.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Microbial Biochemistry

Course Code: MB-14

Course Outcomes: -

CO1: Students will study and learn about structure, classification, identification and properties of carbohydrates.

CO2: Study and learning about structure, classification, identification and Properties of lipids.

CO3: Study and learning about structure, classification, identification and Properties of Amino acids and proteins.

CO4: Understand the Importance of enzymes as biocatalyst and its kinetic.

CO5: Understand Role of vitamins and their chemistry in living organism.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Microbial Genetics

Course Code: MB-21

Course Outcomes: -

CO1: Students will study and learn the mechanism of DNA replication in prokaryotes and eukaryotes.

CO2: Understanding of different types of Mutation and DNA repair pathways.

CO3: Studying the process of protein synthesis in prokaryotes and eukaryotes.

CO4: Learning about Operon concept.

CO5: Gain knowledge about various mechanism of Gene transfer such as transduction, transformation and conjugation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Microbial Physiology

Course Code: MB-22

Course Outcomes: -

CO1: Studying and learning about the mechanism of bacterial photosynthesis.

CO2: Students will learn various metabolic pathways.

CO3: Understand lipid metabolism pathways. .

CO4: Understand the Importance of polysaccharides and biopolymers as cell components.

CO5: Comprehend with application of extremophiles and molecular methods for the study of microbial diversity.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Instrumentation

Course Code: MB-23

Course Outcomes: -

CO1: Studying about working, principle and applications of various types of microscopy.

CO2: Learn basic working, principle and applications of various types of instrumentation of centrifugation.

CO3: Understanding of the working, principle and applications of various types of chromatography techniques.

CO4: Comprehend basic theory and instrumentation of electrophoresis and spectroscopy.

CO5: Learn about various radioisotopes techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Fermentation Technology

Course Code: MB-24

Course Outcomes: -

CO1: Learning about various methods of screening of microorganisms, strain improvement, inoculum development and media for industrially important microbes.

CO2: Comprehend the procedure of harvesting and recovery of commercially product.

CO3: Know about basic design of fermentor and factors affecting growth and production.

CO4: Understand Microbial production of commercially importance products such as solvents, organic enzymes.

CO5: Understand Microbial productions of commercially importance such as antibiotics, vitamins, amino acids.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Molecular Biology and Genetic Engineering

Course Code: MB-31

Course Outcomes: -

CO1: Knowing the terms and terminology related to molecular biology and understanding the structure and functions of genes in living organism at the molecular level.

CO2: Understanding the cloning strategies for construction of gene library.

CO3: Studying about gene amplification – PCR and its applications.

CO4: Understand the importance of Hybridization techniques.

CO5: Learn the concept of recombination, linkage mapping and elucidate the gene transfer mechanism in prokaryotes and eukaryotes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Medical Microbiology

Course Code: : MB-32

Course Outcomes: -

CO1: Learning the basic concept of pathogenic microorganism and the mechanism by which they disease in human body.

CO2: Understanding the importance of bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract.

CO3: Understanding the concept of pathogenicity & toxigenicity.

CO4: Development of diagnostic skills and interpretation of laboratory test in the diagnosis of diseases.

CO5: Studying about various fungal & Viral infections.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Biostatistics and Computer applications

Course Code: MB-33-A

Course Outcomes: -

CO1: Understand different types of data and its representation.

CO2: Calculation and understanding the measure of central tendency and variability.

CO3: Studying and learning about different test of significance and probability theories.

CO4: Learn about basics of computer and its organization.

CO5: Understanding networking fundamentals and MS office.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Microbiology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Microbial Ecology

Course Code: MB-33-B

Course Outcomes: -

CO1: Studying various types of Ecosystems.

CO2: Development of skills to calculate diversity index and their practical application in ecological studies.

CO3: Learning about hardy-Weinberg law of equilibrant of ecology and factors affecting it.

CO4: Study about microbial interaction with human and plants.

CO5: Understand the role of microbiology in sustainable development.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Microbiology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Bioinformatics, Proteomics and Genomics

Course Code: MB-34-A

Course Outcomes: -

CO1: Studying and learning about various biological databases.

CO2: Understanding different algorithms and searching tools for nucleotide and protein sequence.

CO3: Understand the importance and construction of phylogenetic trees.

CO4: Learning of gene expression analysis by DNA microscopy.

CO5: Comprehend with various techniques on proteome analysis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Microbiology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Agriculture Microbiology

Course Code: MB-34-B

Course Outcomes: -

CO1: Learning methods of production of biofertilizer by using bacteria, fungi and cyanobacteria.

CO2: Studying the concept and relation between plant and pathogen in development of disease.

CO3: Understanding the process of development of transgenic resistance varieties.

CO4: Studying about different types of plant diseases caused by fungi, bacteria & virus.

CO5: Comprehend the various control method of plant diseases and importance of microorganism in organic farming.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Microbiology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Basics of Microbiology

Course Code: OE-BM

Course Outcomes: -

CO1: Study of major contributions in the history, branches of microbiology and effects of microbes.

CO2: Knowledge regarding instruments used in microbiology lab.

CO3: Comprehend with various techniques of microbial culture and preservation.

CO4: To study the general characteristics of Bacteria, Algae, Virus and Fungi.

CO5: Learning the concept of control of microorganism and various methods.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Food and Dairy Microbiology

Course Code: MB-41

Course Outcomes: -

CO1: learn various food fermentation procedure for bread, vinegar, beer, wine. Become an entrepreneur by studying mushroom cultivation, single cell protein, probiotics and GOMs.

CO2: Studying food infection and food intoxications, and understand microbiological quality standard of food.

CO3: Understanding the principle techniques of food preservation, and control of food spoilage.

CO4: Comprehend with various techniques using for microbiological analysis of milk and quality control.

CO5: Understanding the applications of microbial enzymes in dairy industry and probiotics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Environmental Microbiology

Course Code: MB-42

Course Outcomes: -

CO1: Learning the occurrence, abundance and distribution in air, and transmission of bacterial fungal and viral diseases through air.

CO2: Understanding various biogeochemical cycles, carbon, nitrogen, phosphorus cycle, and plant microbes interaction specially rhizosphere and phyllosphere.

CO3: Learning the various aspect of environmental microbiology including purification of water, waste water treatment and microbial analysis of water.

CO4: Understanding the importance and application of Immobilized enzymes.

CO5: Understand the role of microorganisms in Bioremediation, Biodeterioration. Bioleaching of metals, Microbial enhancement of oil recovery.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Pharmaceutical Microbiology

Course Code: MB-43-A

Course Outcomes: -

CO1: Exploring the role of microbiologist and job opportunities in pharma industry.

CO2: Training and learning about different tests performed by microbiologist in pharma industry.

CO3: Gain knowledge about antimicrobial agents and drugs.

CO4: Learning of drug delivery systems, drug targeting and mode of antimicrobial agents.

CO5: Gain knowledge about drug development in pharma industry and new vaccine technologies.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Biosafety and IPR Issues

Course Code: MB-43-B

Course Outcomes: -

CO1: Awareness about patents, Trademarks, Copyright & Related Rights etc.

CO2: Learning the concept of patent databases, analysis and report formation.

CO3: Gain knowledge about basics of patents, filing of applications and role of country patent office.

CO4: Basic idea about guideline regarding patent filing and infringement.

CO5: Gain knowledge regarding different biosafety levels, biosafety guideline and environmental release of GOMs.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Bio-Nanotechnology

Course Code: MB-44-A

Course Outcomes: -

CO1: To understand the basic concepts of Nanotechnology in regards to health environment and society.

CO2: Gain knowledge about different spectroscopic techniques involved in Nano technology.

CO3: Comprehend with different spectroscopic techniques involved in microscopic techniques.

CO4: Learning about Nanoparticles and their synthesis.

CO5: Exploring different applications of Nanobiology.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Cell Biology

Course Code: MB-44-B

Course Outcomes: -

CO1: To study prokaryotic and eukaryotic cell structure along with cell wall, cell membrane composition. CO2: To study transport of metabolites access through cell membrane.

CO3: Study about Structure of functions of mitochondria and chloroplast.

CO4: Learn the concept phases of cell cycle and cell division.

CO5: Understand various cell signaling pathways.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of English

Course Name: Personality development

(Open Elective)

Course Code: S1- ----------

Course Outcomes: -

CO1. Cultivate essential life skills and resilience to effectively navigate challenges and setbacks. (Level 1 - Remembering)

CO2. Demonstrate the ability to set meaningful goals and conduct a thorough SWOT analysis for personal and professional development. (Level 2 - Understanding)

CO3. Recognize the importance of time management and stress management techniques to optimize productivity and well-being. (Level 3 - Applying)

CO4. Develop a range of core skills that are highly valued by employers, enhancing employability and career prospects. (Level 3 - Applying)

CO5. Enhance communication skills, including verbal, written, and non-verbal communication, to effectively convey ideas and build relationships. (Level 3 - Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (Pharmaceutical Chemistry Major)

Course Name: Pharmaceutical inorganic Chemistry (Major)

Course Code: S1- PCH1T

Course Outcomes: -

CO1: Understand the principles and techniques used in preparing gastrointestinal and topical agents. Evaluate their properties and assess their effectiveness and safety in treating specific conditions.(Understanding)

CO2: Apply identification assays and testing methods to assess the quality and safety of dental products. Understand the importance of standardized testing and quality control.(Applying)

CO3: . Analyze the role of physiological ions, acid-base balance, and electrolytes in the body. Understand their impact on homeostasis and the mechanisms involved in regulating them.(Analyzing)

CO4: Evaluate scientific literature and research studies on gastrointestinal and topical agents. Make evidence-based recommendations for their use in clinical practice.(Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (Pharmaceutical Chemistry Major)

Course Name: Pharmaceutical organic Chemistry (Minor)

Course Code: S1- PCH 2T

Course Outcomes: -

CO1. Gain a basic understanding of pharmaceutical organic Chemistry , including the structure, properties, and reactivity of organic compounds commonly used in the pharmaceutical industry. (Remembering)

CO2. Explain the concept of stereo Chemistry , including the arrangement of atoms and groups in three-dimensional space, and understand how it influences the properties and reactivity of organic compounds. (Understanding)

CO3. Describe the fundamental principles of reaction mechanisms in organic Chemistry , including the step-by-step processes that occur during chemical reactions, and how they determine the outcome of the reaction.

. (Understanding)

CO4. Identify and analyze various types of organic reactions, such as substitution, addition, elimination, and oxidation-reduction reactions, and understand their mechanisms and the factors that influence their outcomes. (Understanding)

CO5. Apply knowledge of organic reaction mechanisms to practical situations. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (Pharmaceutical Chemistry Major)

Course Name : Fundamental of Drug Chemistry (Open Elective)

Course Code: S1- PCH 3T

Course Outcomes: -

CO1 Gain preliminary knowledge of Pharmaceutical Chemistry , its branches, and its importance, and develop an understanding of the origin of the Earth.(Understanding)

CO2 Understand the factors that influence drug distribution and how they impact drug efficacy and toxicity.(Understanding)

CO3. Understand the concept of drug activity and how metabolism affects drug potency, duration of action, and potential adverse effects.(Understanding)

CO4. Understand about drug metabolism, including the enzymatic processes involved in converting drugs into metabolites Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (Pharmaceutical Chemistry Major)

Course Name: Pharmaceutical Organic Chemistry (Major)

Course Code: S2- PCH 1T

Course Outcomes: -

CO1. Gain a solid understanding of the basic concepts of pharmaceutical organic Chemistry , including the structure, bonding, and functional groups of organic compounds commonly used in the development of drugs.(Remembering)

CO2. Comprehend the principles of stereo Chemistry , including the three-dimensional arrangement of atoms in organic compounds and their significance in drug design and activity.(Understanding)

CO3. Apply knowledge of reaction mechanisms to explain how organic compounds undergo chemical transformations.(Applying)

CO4. Evaluate the factors that influence the rate, selectivity, and efficiency of organic reactions in the context of pharmaceutical synthesis. (Analyzing)

CO5 Evaluate the practical applications of organic reactions in pharmaceutical Chemistry .(Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (Pharmaceutical Chemistry Major)

Course Name: Pharmaceutical Inorganic Chemistry (Minor)

Course Code: S2- PCH 2T

Course Outcomes: -

CO1. Understand the preparation methods of gastrointestinal agents and topical agents, including their key properties and intended use .(Remembering)

CO2 Explain the modes of administration for gastrointestinal and topical agents, as well as their mechanisms of action.(Understanding)

CO3 Describe the preparation process of dental products, such as toothpaste, mouthwash, and dental restorative materials .(Understanding)

CO4. Discuss the identification assays used to ensure the quality, potency, and safety of dental products.(Understanding)

CO5. Explain the concept of physiological acid-base balance and its importance in regulating various physiological processes.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (Pharmaceutical Chemistry Major)

Course Name: Basic concept of Pharmaceutical Chemistry

(Open Elective)

Course Code: S2- PCH 3T

Course Outcomes: -

CO1: Understand the basic concepts of pharmaceutical Chemistry , focusing on the study of drugs, their synthesis, and their interactions with biological systems .(Remembering)

CO2: Explain the activities of pharmaceutical compounds, including their therapeutic effects, mechanisms of action, and potential side effects. (Understanding)

CO3: Understand how drugs are absorbed, distributed, metabolized, and eliminated. Recognize the factors influencing drug absorption and bioavailability.(Understanding)

CO4: Demonstrate knowledge of drug metabolism and pharmacokinetics in the human body.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (IInd Year)

Course Name: Medicinal Chemistry-I

Course Code: 216-I

Course Outcomes: -

CO1: Relate physicochemical properties to biological action.

CO2: Summarize MOA and classification of local and general anesthetics.

CO3 Explain MOA, SAR and classification of hypnotics, sedatives and anticonvulsants.

CO4: Illustrate MOA, SAR of analgesics, antipyretics and antihistamines.

CO5: Explain MOA, SAR and classification of diuretics and antihypertensive.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (IInd Year)

Course Name: Chemistry of natural products

Course Code: 216-II

Course Outcomes: -

CO1: Categorize heterocyclic compounds.

CO2: Summarize classification and structures of carbohydrates.

CO3: Explain amino acids and proteins.

CO4: Summarize alkaloids and glycosides.

CO5: Describe terpenes and steroids.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (IIIrd Year)

Course Name: Medicinal Chemistry-II

Course Code: :316-I

Course Outcomes: -

CO1: Illustrate MOA, SAR and classification of adrenergic and anticoagulants, expectorants and antitussive agents.

CO2: Illustrate SAR , MOA and classification of antibiotics and sulphonamides.

CO3: Illustrate SAR, MOA and classification of anti-malarials , antituberculars and anti-amoebic drugs.

CO4: Illustrate SAR, MOA and classification of antidiabetics and antineoplastic agents.

CO5: Apply different approaches in drug design.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: B.Sc. (IIIrd Year)

Course Name: Instrumental analysis

Course Code: 316-II

Course Outcomes: -

CO1: Illustrate conductometric, potentiometric and polarographic methods of analysis of drugs.

CO2: Analyze UV and IR spectroscopy.

CO3: Interpret NMR and Mass spectra.

CO4: Illustrate TLC and paper chromatography. CO5: Explain HPLC and gas chromatography.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (Ist Sem.)

Course Name: Principles of Inorganic Pharmaceutical Chemistry

Course Code: PC-11

Course Outcomes: -

CO1: Illustrate basic concept of coordination Chemistry.

CO2: Relate theories of metal ligand bonding in complexes.

CO3: Illustrate reaction mechanisms of transition metal complexes.

CO4: Categorize complex and chelating agents used in drug therapy.

CO5: Explain bioinorganic chemistry.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (Ist Sem.)

Course Name: Principles of Organic Pharmaceutical Chemistry

Course Code: PC-12

Course Outcomes: -

CO1: Illustrate concept of chirality and conformational analysis.

CO2: Conclude methods of determining reaction mechanism.

CO3: Summarize aromaticity and anti-aromaticity.

CO4: Illustrate mechanisms and synthetic applications of molecular rearrangement reactions.

CO5: Illustrate mechanisms and synthetic applications of some important naming reactions.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (Ist Sem.)

Course Name: Principles of Physical Pharmacy-I

Course Code: PC-13

Course Outcomes: -

CO1: Correlate various thermodynamic variables.

CO2: Determine order of reactions. CO3: Illustrate diffusion and dissolution procedure.

CO4: Illustrate methods of measurement of surface and interfacial tension.

CO5: Illustrate methods for determining particle size, shape and surface area.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (Ist Sem.)

Course Name: Pharmaceutical Analysis-I

Course Code: PC-14

Course Outcomes: -

CO1: Interpret IR spectroscopy.

CO2: Illustrate NMR spectroscopy.

CO3: Explain Raman spectroscopy.

CO4: Illustrate ESR spectroscopy.

CO5: Apply AAS in pharmaceutical analysis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IInd Sem.)

Course Name: Principles of Inorganic Pharmaceutical Chemistry II

Course Code: PC-21

Course Outcomes: -

CO1: Illustrate test of purity and purification of inorganic substances.

CO2: Illustrate synthesis and uses of gastrointestinal and topical agents.

CO3: Illustrate synthesis and uses of antioxidants, emetics and astringents.

CO4: Apply use of radioisotopes in pharmacy.

CO5: Use of calcium and iron compounds as pharmaceutical agents .

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IInd Sem.)

Course Name: Principles of Organic Pharmaceutical Chemistry II

Course Code: PC-22

Course Outcomes: -

CO1: Classify drugs on the basis of chemical structure and therapeutic uses.

CO2: Relate physicochemical properties to biological action.

CO3: Use of reagents in organic synthesis.

CO4: Synthesize heterocyclic compounds of biological significance.

CO5: Illustrate mechanism of addition reactions to carbon hetero multiple bonds.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IInd Sem.)

Course Name: Principles of Physical Pharmacy- II

Course Code: PC-23

Course Outcomes: -

CO1: Apply concept of rheology to pharmacy.

CO2: Illustrate formulation of suspensions and emulsions.

CO3: Illustrate routes of drug administration.

CO4: Classify polymers on the basis of source and structure.

CO5: Determine glass transition temperature in polymers.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IInd Sem.)

Course Name: Pharmaceutical Analysis - II

Course Code: PC-24

Course Outcomes: -

CO1: Interpret column , paper and gas liquid chromatography.

CO2: Illustrate HPLC, Ion exchange and Gel chromatography.

CO3: Illustrate extraction of solid and liquid from solvent extraction method.

CO4: Relate titrimetric and gravimetric methods of quantitative analysis.

CO5: Categorize nephelometry, turbidimetry and flame photometry.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Medicinal Chemistry

Course Code: PC-31

Course Outcomes: -

CO1: Classify NSAIDs and illustrate their MOA, SAR and uses.

CO2: Illustrate MOA, SAR and uses of local and general anesthetics.

CO3: Illustrate SAR and uses of antihypertensives drugs and diuretics.

CO4: Illustrate SAR, MOA and uses of antihistamins , antimalarials and antitubercular agents.

CO5: Illustrate SAR, synthesis and uses of sulphonamides and antineoplastic agents.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Chemistry of Natural products

Course Code: PC-32

Course Outcomes: -

CO1: Classify terpenoids and carotenoids.

CO2: Determine structure of alkaloids.

CO3: Determine structure of steroids.

CO4: Determine structure of plant pigments.

CO5: Classify prostaglandins.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Toxicology

Course Code: PC-33-A

Course Outcomes: -

CO1: Classify toxicants and carcinogens.

CO2: Illustrate mechanism of tolerance and dependence of drugs.

CO3: Summarize general treatment and management of poisoning.

CO4: Conclude detailed treatment of poisoning of morphine, alcohol, cocaine and heavy metals.

CO5: Illustrate mechanism of drug interaction, effects of drugs on pregnancy.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Pharmaceutical Biotechnology

Course Code: PC-33-B

Course Outcomes: -

CO1: Summarize basics of immunology.

CO2: Categorize vaccines.

CO3: Illustrate structure of DNA and its functions.

CO4: Illustrate gene cloning.

CO5: Summarize gene therapy.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Pharmacognosy

Course Code: PC-34-A

Course Outcomes: -

CO1: Classify drugs on the basis of plant products.

CO2: Categorize pest and pest control methods.

CO3: Classify and summarize carbohydrates.

CO4: Summarize glycosides and Resins.

CO5: Illustrate preparation of biomedicinals from plant tissue culture.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Applied Pharmaceutics- I

Course Code: PC-34-B

Course Outcomes: -

CO1: Summarize material handling system.

CO2: Prepare infusion. tinctures and extracts.

CO3: Illustrate packaging of pharmaceutical products.

CO4: Illustrate preparation of cosmetics.

CO5: Categorize chemical properties of drugs.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Health Chemistry

Course Code: OE-HC

Course Outcomes: -

CO1: Summarize carbohydrates, proteins and vitamins as a health products.

CO2: Classify drugs.

CO3: Summarize different types of body fluids.

CO4: Categorize enzymes and hormones.

CO5: Summarize some common diseases.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IVth Sem.)

Course Name: Advanced Medicinal Chemistry

Course Code: PC-41

Course Outcomes: -

CO1: Summarize insulin and some hormones.

CO2: Explain pharmacodynamics of enzymes.

CO3: Illustrate SAR of skeletal muscle relaxants, narcotic analgesics and anticholinergic drugs.

CO4: Illustrate SAR of anticoagulants, immunosuppressant's antiviral and antiprotozoals.

CO5: Illustrate MOA and SAR of ant parkinsonism, antihyperlipidemic antifungal and antiulcer drugs .

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IVth Sem.)

Course Name: Modern Analytical Techniques

Course Code: PC-42

Course Outcomes: -

CO1: Illustrate applications of FT-IR and C 13 NMR spectroscopy.

CO2: Illustrate applications of mass spectroscopy.

CO3: Apply Fluorimetry, Phosphorimetry, Auto radiography, Ultracentrifugation in drug analysis. CO4: Summarize immunoassay techniques.

CO5: Summarize thermal methods and polarimetry.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IVth Sem.)

Course Name: Drug Design

Course Code: PC-43-A

Course Outcomes: -

CO1: Summarize drug design and its discovery.

CO2: Illustrate structure aided and mechanism-based drug design.

CO3: Categorize pharmacophoric approach of drug design. CO4: Use of 3D QSAR approach in drug design.

CO5: Use of computers in medicinal chemistry.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IVth Sem.)

Course Name: Pharmacology

Course Code: PC-43-B

Course Outcomes: -

CO1: Summarize general pharmacology and neurohumoral transmission in CNS.

CO2: Categorize psychopharmacological agents.

CO3: Summarize drugs acting on the gastrointestinal tract.

CO4: Summarize drugs acting on haematopoietic system.

CO5: Explain autocoids.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IVth Sem.)

Course Name: Biopharmaceutics and Pharmacokinetics

Course Code: PC-44-A

Course Outcomes: -

CO1: Categorize methods of studying gastrointestinal absorption.

CO2: Summarize pharmacokinetics of the drugs.

CO3: Categorize pharmacokinetic models of the drugs.

CO4: Categorize pharmacokinetic parameters of one compartment model.

CO5: Explain bioavailability and bioequivalence.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Pharmaceutical Chemistry

Programme Name: M.Sc. (IVth Sem.)

Course Name: Applied Pharmaceutics -II

Course Code: PC-44-B

Course Outcomes: -

CO1: Illustrate formulation of various types of tablets.

CO2: Categorize capsule dosage forms.

CO3: Summarize liquid and semisolid dosage forms.

CO4: Illustrate ophthalmic and parenteral preparations.

CO5: Summarize microcapsulation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Sports

Course Name: Introduction and concept of physical education

(Open Elective)

Course Code: S1- ----------

Course Outcomes: -

CO1. Recall the importance of physical education and sports for personal growth and success in various aspects of life. (Level 1 - Remembering)

CO2. Understand the role of physical activity and sports in promoting fitness, health, and overall well-being, and apply this understanding to their own lifestyle choices. (Level 2 - Understanding)

CO3. Analyze the impact of sports-related events, athletes, and trends on society, and evaluate their significance in competitive exams and public service commission. (Level 3 - Analyzing)

CO4. Apply knowledge of sports science and physical education principles to enhance performance and skill development in various sports activities. (Level 3 - Applying)

CO5. Evaluate the social and cultural implications of participating in physical education and sports, and recognize the importance of inclusivity, teamwork, and fair play. (Level 3 - Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Sports

Course Name Introduction and concept of physical education

Course Code: S2- -----T

Course Outcomes: -

CO1. Understand the structure of physical education in India and at the international level, including the role of organizations like the United Children's Emergency Fund (UNICEF) in promoting the concept of sports for all. (Level 1 - Understanding)

CO2. Identify the components of fitness related to both health and skill, and recognize the benefits of warm-up and cool-down exercises. Develop an understanding of the importance of nutrition and a balanced diet for physical well-being. (Level 2 - Understanding)

CO3. Gain awareness of sports-related events and concerns, as well as other relevant areas, that can contribute to success in competitive examinations such as the Public Service Commission. (Level 2 - Understanding

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name: Thermodynamics and Statistical mechanics (Major)

Course Code: S1- PHY1T

Course Outcomes: -

CO1: Understand the fundamental principles of heat and temperature in the context of energy, work, radiation, and matter in physics. Gain a comprehensive knowledge of their interrelationships. (Remembering)

CO2: Apply the laws of thermodynamics to analyze and comprehend how heat engines efficiently convert heat into useful work. Explore the practical applications of thermodynamic principles. (Applying)

CO3: Apply statistical concepts and methods to understand thermodynamics, such as probability and statistical distributions. Develop proficiency in utilizing statistical tools in the study of thermodynamic systems.(Applying)

CO4 Examine the significance of studying statistical mechanics and its relevance to the behaviour of particles in both classical and quantum conditions. (Analyzing):.

CO5: Gain insights into the underlying principles governing the behavior of systems at the atomic and molecular levels. (Evaluating):

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name: Mechanics and General Properties of Matter (Minor)

Course Code: S1- PHY 2T

Course Outcomes: -

CO1. Recall and describe the basic characteristics and properties of physical bodies. (Remembering)

CO2. Explain the principles and laws governing the behavior of physical bodies, such as Newton's laws of motion and principles of equilibrium.. (Understanding)

CO3. Understand the basic principles and concepts that underpin mechanical engineering, such as mechanics, thermodynamics, and material science.. (Understanding)

CO4 The student will acquire the knowledge of basic mathematics to solve various problems in physics.. (Understanding)

CO5. Apply mathematical principles and problem-solving techniques to analyze and solve physics problems (Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name : Mechanics and general properties of matter

(Open Elective)

Course Code: S1- PHY 3T

Course Outcomes: -

CO1. Recall and describe the basic characteristics and properties of physical bodies. (Remembering)

CO2. Understand the basic concepts related to the motion of all objects around us in daily life.. (Understanding)

CO3. Understand the basic principles and concepts that underpin mechanical engineering, such as mechanics, thermodynamics, and material science.. (Understanding)

CO4 The student will acquire the knowledge of basic mathematics to solve various problems in physics.. (Understanding)

CO5. Understand mathematical principles and problem-solving techniques to analyze and solve physics problems (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name : Mechanics and general properties of matter

(Open Elective)

Course Code: S1- PHY 4T

Course Outcomes: -

CO1. Develop a solid understanding of different non-conventional energy resources, including their characteristics, advantages, and applications. (Remembering)

CO2. Learn about the various systems and devices involved in harnessing energy from renewable sources. (Understanding)

CO3. Understand the availability and potential of non-conventional energy resources in India.(Understanding)

CO4 Gain a comprehensive understanding of solar energy and its applications. Learn about the principles of solar energy conversion. (Understanding)

CO5. Understand the technical skills in non-conventional energy harvesting (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name: Mechanics and General properties of matter (Major)

Course Code: S2- PHY 1T

Course Outcomes: -

CO1. Understand the behaviour of physical bodies through scientific principles. (Remembering)

CO2 Apply basic concepts of motion to daily life situation. (Applying)

CO3 Build a strong foundation in applied fields of Science and Technology, focusing on mechanical engineering. (Applying)

CO4. Acquire mathematical skills to solve physics problems. (Analyzing)

CO5 Comprehend the relativistic effect and the energy-mass relationship. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name: Thermodynamics and Statistical Mechanics (Minor)

Course Code: S2- PHY 2T

Course Outcomes: -

CO1. Understand the basic principles of heat and temperature in relation to energy, work, radiation, and matter. (Remembering)

CO2 Apply the laws of thermodynamics to analyze the transfer of heat into work in a heat engine. (Applying)

CO3. Develop an understanding of statistical concepts and their application in thermodynamics. (Applying)

CO4. Understand the significance of studying statistical mechanics in relation to the behavior of particles under Classical and Quantum conditions. Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name: Thermodynamics (Open Elective)

Course Code: S2- PHY 3T

Course Outcomes: -

CO1: . Understand the fundamental principles of heat, temperature, energy, work, radiation, and matter in the context of physics. (Remembering)

CO2: Learn how the laws of thermodynamics are applied to heat engines for the conversion of heat into work. (Understanding)

CO3: Develop an understanding of statistical concepts and their application in the field of Thermodynamics . (Understanding)

CO4: Recognize the significance of studying statistical mechanics in understanding the behavior of particles under Classical and Quantum conditions. (Understanding)

Government Holkar (Model Autonomous) Science College, , Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (Physics Major)

Course Name: Non- conventional energy sources-II

(Open Elective)

Course Code: S2- PHY 4T

Course Outcomes: -

CO1: Develop a solid understanding of biomass energy resources, including their characteristics and applications **(Remembering)**

CO2: Gain a comprehensive understanding of wind energy, geothermal energy, and ocean energy, including their principles and potential for harnessing renewable power. (Understanding)

CO3: Acquire a thorough understanding of geothermal energy and ocean energy, exploring their sources, technologies, and environmental impacts. (Understanding)

Government Holkar (Model Autonomous) Science College, , Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (IInd Year)

Course Name: Optics

Course Code: 217-1

Course Outcomes: -

CO1: Classify types of aberrations and achromatism and different types of eyepieces.

CO2: Interference pattern, able to apply the interference pattern to determine the wave length. And able to compare different type of the fringes, determination of fringe width.

CO3: Analyze Diffraction pattern and dispersive power of the grating.

CO4: Analyze different types of polarized light. CO5: Basic principle, characteristics and application of laser.

Government Holkar (Model Autonomous) Science College, , Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (IInd Year)

Course Name: Electrostatics, Magneto Statics and Electrodynamics

Course Code: 217-II

Course Outcomes: -

CO1: Basic of Electrostatics and able to apply Gauss's law finding E for symmetric charge distribution.

CO2: Basic of magnetostatics Force on a moving charge, Lorentz force.

CO3: Basic of Current Electricity and application of Ac circuits complex numbers in order to solve the Ac circuits problems.

CO4: Motion of Charged Particles in Electric and Magnetic Fields and able to examine types of signals using CRO.

CO5: Basic of electrodynamics and able to evaluate the Electromagnetic wave equation.

Government Holkar (Model Autonomous) Science College, , Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (IIIrd Year)

Course Name: Quantum Mechanics and Spectroscopy

Course Code: 317-I

Course Outcomes: -

CO1: Importance of quantum mechanics compared to classical mechanics at microscopic level.

CO2: Various tools to calculate Eigen values and total angular momentum of particles. wave function and able to derive the Schrödinger equation and interpret the wave function and eigenvalue equation.

CO3: Different types of potentials and derive the solutions of Schrödinger equation for the same.

CO4: Application of approximation methods and scattering theories. CO5: Atoms in electric and magnetic fields and various types of spectra.

CO6: Explain nuclei properties, compare a drop of liquid with that of a nucleus and understand Shell able calculate Q-value of a reaction model.

Government Holkar (Model Autonomous) Science College, , Indore (M.P.)

Department of Physics

Programme Name: B.Sc. (IIIrd Year)

Course Name: Solid state Physics and Semiconductor Devices

Course Code: 317-II

Course Outcomes: -

CO1: Have a basic knowledge of semiconductor physics.

CO2: Acquire knowledge about how a semiconductor diode rectifies an input ac signal.

CO3: Learn how to construct a transistor amplifier and how its gain varies with frequency size dependent properties 3D, 2D,1D,0D.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Mathematical Physics

Course Code: P-11

Course Outcomes: -

CO1: Solve partial differential equations by use of polynomials method.

CO2: Apply integral transform (Fourier and Laplace) to solve mathematical problems of interest in physics, use Fourier transforms as an aid for analyzing experimental data

CO3: Green, s function and its application in boundary value problem

C04: Apply the basic elements of complex mathematical analysis, including the integral theorems, obtain the residues of a complex function and to use the residue theorem to evaluate definite integrals

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Classical Mechanics

Course Code: P-12

Course Outcomes: -

CO1: Describe the physical principle behind the derivation of Lagrange and Hamilton's equations, and the advantages of these formulations.

CO2: Relate symmetries to conservation laws in physical systems, and apply these concepts to practical situations,

CO3: Describe the intricacies of moving-reference frames and rigid-body motion.

C04: Solve small oscillations using Legendre transformations and Hamiltonian

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Quantum Mechanics- I

Course Code: P-13

Course Outcomes: -

CO1: Get knowledge about wave mechanics

CO2: Solve one dimensional and three-dimensional problem using Schrodinger equation

CO3: Acquire knowledge about the importance of operators in quantum mechanics

CO4: Understand the commutation relations, in turn determine eigen values

CO5: Ability to develop the problem-solving skills in quantum mechanics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Electronic Devices

Course Code: P-14

Course Outcomes: -

CO1: Comprehend and compare the different characteristics of semiconductor devices and their various applications.

CO2: Understand Photonic devices.

CO3: Acquire the knowledge of ROM, PROM, EPROM.

CO4: Interpret the basics of semiconductor physics and its importance in various optoelectronic.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IInd Sem.)

Course Name: Quantum Mechanics-II

Course Code: P-21

Course Outcomes: -

CO1: Learn about the fundamental difference between time dependent and time independent perturbation theory.

CO2: Grasp the concept of WKB approximation and its application.

CO3: Explore the features of Scattering cross section using different formula.

CO4: Use of Dirac equation, Dirac matrices, The Klein Gordon equation in solving the QM problems etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc(IInd Sem.)

Course Name: Statistical Mechanics

Course Code: P-22

Course Outcomes: -

CO1: Gain knowledge basic concept of ensembles.

CO2: Compute properties of systems behaving as ideal Fermi gas or ideal Bose gas.

CO3: Evaluate viral coefficient. CO4: Application Thermodynamics fluctuation.

CO5: Value of the phase transitions and extend these ideas to quantum world. To understand phase transition.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IInd Sem.)

Course Name: Electrodynamics and Plasma Physics

Course Code: P-23

Course Outcomes: -

C01: Apply Maxwell equations in analyzing the nature of electromagnetic field due to time varying charge and current distribution.

C02: Illustrate vector potential and electric field of a localized current distribution using multipole expansion problems.

C03: Analyze the nature of electromagnetic wave and its propagation through different media and interfaces.

C04: Understand Complex physical phenomena observed in plasma. CO5: Characterize Domain of Magneto hydrodynamics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IInd Sem.)

Course Name: Atomic and Molecular Physics

Course Code: P-24

Course Outcomes: -

CO1: Classify Atomic Spectra of alkali elements.

CO2: Application Xray and Rotation Spectra. CO3: Apply Vibrational spectra and IR Spectrometer.

CO4: Understand Theory and nature of Raman spectroscopy and its applications.

CO5: Analyze Zeeman and Paschen back effect.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Condensed Matter Physics-I

Course Code: P-31

Course Outcomes: -

CO1: Apply the concept of Bragg diffraction to analyse the structure of a crystal and correlate the outcome to the 2D/3D Ewald construction.

CO2: Develop a concept of the crystal classes, symmetries and the relationship between real and reciprocal space.

CO3: Interpret the electrical and thermal properties of metals and semiconductors on the basis of the free electron mode.

CO4: Formulate models for vibrational motion of crystals and explain thermal properties of crystalline solids based on this.

CO5: Interpret the electrical and thermal properties of metals and semiconductors on the basis of the free electron mode.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Nuclear and Particle Physics

Course Code: P-32

Course Outcomes: -

CO1: Recall the general properties and concepts of nuclei.

CO2: Illustrate different type of nuclear reactions and understand the working of nuclear reactors

CO3: Differentiate models of nucleus for better understanding of nuclear interaction and review the reaction dynamics.

CO4: Nuclear decay processes and their outcomes. Have a wide understanding regarding beta and gamma decay.

CO5: Design a table of elementary particles, classify mass spectra, elementary particles and their decay mechanisms.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Digital Electronics

Course Code: P-33

Course Outcomes: -

CO1: Conversion of Number System.

CO2: Apply Number codes and basic of logic gates.

CO3: Construct Flip-flop and registers.

CO4: Assemble Counters.

CO5: Devople ADC and DAC.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Atomic and Molecular

Course Code: P-34

Course Outcomes: -

CO1: Apply the Nuclear Magnetic Resonance Spectroscopy.

CO2: Understand Electronic spectra of Diatomic molecules.

CO3: Use of Raman Spectra in determining the structure.

CO4: Application of Mossbauer Spectroscopy.

CO5: Understand Electron Spin Resonance spectroscopy.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Condensed Matter Physics-II

Course Code: P-41

Course Outcomes: -

CO1: Desribe Superconductivity.

CO2: Analyse Fundamentals of ferroelectric properties of materials.

CO3: Determine Imperfection in crystal.

CO4: Understand Thin film.

CO5: List Nano Structure.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Laser Physics

Course Code: P-42

Course Outcomes: -

CO1: Explain operational principles and construction of lasers.

CO2: Interpret Properties of Laser Beams and Resonators.

CO3: Distigush type of laser.

CO4: Application of laser.

CO5: Understand Basic idea about non-linear optics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Computational Methods and Programming

Course Code: P-43-B

Course Outcomes: -

CO1: Develop programming concepts in solving problems in Physics.

CO2: Determine the of Zeros of algebraic equation.

CO3: Calculate Eigen value and Eigen vector of Matrices.

CO4: Solve numerical differentiation and integration whenever and wherever routine methods are not applicable.

CO5: Solve ordinary differential equation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Physics

Programme Name: M.Sc. (IVth Sem.)

Course Name: : Communication Electronics

Course Code: P-44-A

Course Outcomes: -

CO1: Understand Basic of Modulations.

CO2: Explain Propagation of waves

CO3: Describe Microwave transmission

CO4: Classify Basic of digital communication

CO5: Handle Data transmission

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (Seed Technology Major)

Course Name: Principles of Seed Technology (Major)

Course Code: S1-SEED1T

Course Outcomes: -

CO1: Recall and identify the various organizations involved in the development of the seed industry.(Remembering)

CO2: Explain the importance of testing methods in the seed industry, including seed germination testing, deterioration testing, and assessing seed dormancy. (Understanding)

CO3: . Describe the process and techniques used in the production of hybrid seeds, including cross-pollination and selection methods.(Applying)

CO4: Analyze and evaluate the roles and contributions of different organizations in the development of the seed industry, considering their impact on seed quality, availability, and diversity.(Analyzing)

CO5: Design and propose improvements for seed testing methods and procedures to ensure more accurate and reliable results.(Evaluating)

CO6: Create a comprehensive plan for a sustainable seed production system, considering factors such as genetic diversity, environmental sustainability, and market demands.(Creating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (Seed Technology Major)

Course Name: Seed production and Practice (Minor)

Course Code: S1-SEED2T

Course Outcomes: -

CO1. Recall and identify different methods of seed production.(Remembering)

CO2. Explain the process and techniques involved in seed production for vegetative, oil, fiber, and sugar crops.(Understanding)

CO3. Describe common weed species and their impact on crop growth, as well as methods of weed control.(Understanding)

CO4. Explore the production techniques and benefits of hybrid seeds.(Understanding)

CO5. Compare and contrast different methods of seed production for various crops, considering their advantages and limitations.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (Seed Technology Major)

Course Name: Principals of Seed Technology (Open Elective)

Course Code: S1-SEED3T

Course Outcomes: -

CO1. Recognize and name various organizations involved in the development of the seed industry.(Remembering)

CO2. Understand the significance of testing methods in seed production, including seed germination, deterioration, dormancy, and other important aspects.(Understanding)

CO3. Identify the factors contributing to the development of hybrid seeds. (Remembering)

CO4. Recall the importance of testing methods in determining seed quality and performance. (Remembering)

CO5. Explain the basic principles and techniques involved in hybrid seed production.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (Seed Technology Major)

Course Name: Seed production and practice (Major)

Course Code: S2-SEED1T

Course Outcomes: -

CO1. Recall and identify different methods of seed production for various crops, such as conventional breeding, genetic modification, tissue culture, and synthetic seed production.(Remembering)

CO2. Explain the intricate process and techniques involved in seed production for vegetative, oil, fiber, and sugar crops, emphasizing pollination, selection, harvesting, and post-harvest treatments.(Understanding)

CO3. Analyze the impact of common weed species on crop growth, assess their competitive abilities, allelopathic effects, and propose integrated weed management strategies.(Analyzing)

CO4. Evaluate the production techniques and benefits of hybrid seeds, considering increased vigor, improved yield potential, hybrid vigor, and challenges associated with hybrid purity maintenance.(Evaluating)

CO5 Create a comprehensive comparative analysis of different methods of seed production for various crops, considering advantages, limitations, economic feasibility, and develop a guide for selecting the most suitable method. (Creating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (Seed Technology Major)

Course Name: Principles of Seed Technology (Minor)

Course Code: S2-SEED2T

Course Outcomes: -

CO1. Recall and describe the various organizations involved in the development of the seed industry.(Remembering)

CO2 Explain the importance of testing methods in seed industry, such as testing for seed germination, deterioration, and dormancy.(Understanding)

CO3. Describe the process and techniques used in the production of hybrid seeds. (Understanding)

CO4. Compare and contrast the roles of different organizations in the development of the seed industry.(Understanding)

CO5. Evaluate the significance of testing methods in ensuring quality and viability of seeds in the seed industry.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (Seed Technology Major)

Course Name: Seed production and practice

(Open Elective)

Course Code: S2-SEED3T

Course Outcomes: -

CO1: Recognize and name different methods of seed production.(Remembering)

CO2: Understand the techniques used in seed production for vegetative, oil, fiber, and sugar crops.(Understanding)

CO3: Identify common weeds and be aware of methods for their control. (Remembering)

CO4: . Gain knowledge about the production of hybrid seeds.(Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (IInd Year)

Course Name: Plant breeding

Course Code: 218 -I

Course Outcomes: -

CO1: (a)Student can write about self-incompatibility and male sterility.

(b)Student can know how to correlate male sterility to breeding work.

CO2: Student can know value of seed bank and use of selection method of variety development.

CO3: Student will learn how to develop new hybrid variety and write about use of emasculation in hybridization.

CO4: Student will learn how to use heterosis in hybrid seed production.

CO5: Student can know value of insect and disease resistance varieties in crop production.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (IInd Year)

Course Name: Seed Testing and Quality Control

Course Code: – 218 - II

Course Outcomes: -

CO1: Student will learn about how to design seed testing lab and how to categorize seed sample.

CO2: Student will learn to play a role of seed testing in seed industry.

CO3: Student can know how to correlate seed standard in quality seed production.

CO4: Seed crop inspection will illustrate to student.

CO5: Student will understand the seed law and policies in quality seed production.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (IIIrd Year)

Course Name: Seed Pathology and Entomology

Course Code: 318 - I

Course Outcomes: -

CO1: Student can know how to judge seed borne diseases and categorize according to pathogens.

CO2: Student can understand how to recognize seed borne fungi and write about dry seed examination. CO3: Student can know about mycotoxins and how to judge mycotoxicosis.

CO4: Student will be able to sketch life cycle of insect and write about insect control.

CO5: Student will be able to value different insecticides and understand about their significance.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Seed Technology

Programme Name: B.Sc. (IIIrd Year)

Course Name: Seed Processing, Storage and Marketing

Course Code: 318 - II

Course Outcomes: -

CO1: (a)students of seed technology can know the importance of seed processing and play role in seed industry.

(b)Student will be able to design layout of seed processing plant and

CO2: (a) Student will understand the value of seed blending and play a role in screening and cleaning of seeds.

(b) Students can know how to Grade seeds by seed grader.

CO3: Student will learn about how to categorize seed treating chemicals and classify them.

CO4: Student will understand how to design storage house and how to make plan for insect control in storage house.

CO5: Student will understand the seed marketing components in seed industry and know how to collaborate with seed company and seed dealers.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (Statistics Major)

Course Name: Descriptive Statistics (Major)

Course Code: S1- STAT1T

Course Outcomes: -

CO1: Compile data and present it in tabular and graphical forms, demonstrating the ability to analyze and interpret the data and compute measures of central tendency. (Applying)

CO2: Analyze and interpret qualitative data (attributes), demonstrating an understanding of methods and techniques to analyze non-numerical data. (Understanding)

CO3: Calculate elementary measures, such as mean, median, and mode, to characterize the given data and understand their significance. (Applying)

CO4: Study bivariate data and calculate the correlation coefficient between random variables, showing the ability to analyze the relationship between variables. (Analyzing)

CO5: Determine regression lines and curves for bivariate and trivariate data, demonstrating the ability to analyze and interpret the relationship between variables. (Analyzing)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of STATnomics

Programme Name: B.Sc. (Statistics Major)

Course Name: Basic Statistics

(Minor)

Course Code: S1- STAT2T

Course Outcomes: -

CO1. Compile and present data in tabular and graphical forms, and compute measures of central tendency, demonstrating the ability to organize and summarize data. (Remembering)

CO2. Compute elementary measures, such as mean, median, and mode, to characterize the given data, showing the ability to calculate and interpret basic statistical measures. (Understanding)

CO3. Study bivariate data and calculate the correlation coefficient between random variables, demonstrating an understanding of the relationship between variables. (Understanding)

CO4 Obtain regression lines and curves for bivariate and trivariate data, showing the ability to analyze and interpret the relationship between variables using regression analysis. (Applying)

CO5. Understand and interpret qualitative data (attributes), demonstrating an understanding of methods and techniques to analyze non-numerical data and draw meaningful conclusions. (Bloom's Level: Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (Statistics Major)

Course Name : Elementary Statistics (Open Elective)

Course Code: S1- STAT3T

Course Outcomes: -

CO1 Compile and present data in tabular and graphical forms, and calculate measures of central tendency such as mean, median, and mode, demonstrating the ability to organize, summarize, and analyze data. (Understanding)

CO2 Compute elementary measures, including range, variance, and standard deviation, to characterize the given data, showing the ability to calculate and interpret basic statistical measures accurately. (Applying)

CO3. Study bivariate data and calculate the correlation coefficient between random variables, demonstrating an understanding of the relationship between variables and the ability to interpret the strength and direction of the correlation. (Understanding)

CO4 Obtain regression lines and curves for bivariate and trivariate data, using appropriate statistical techniques to analyze the relationship between variables and make predictions, demonstrating an understanding of regression analysis. (Applying)

CO5. Interpret qualitative data (attributes) using appropriate methods such as thematic analysis or content analysis, demonstrating the ability to identify patterns, themes, and insights from non-numerical data. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (Statistics Major)

Course Name: Probability and Probability Distribution (Major)

Course Code: S2- STAT1T

Course Outcomes: -

CO1 Apply the basic probability rules, including the additive and multiplicative laws, to determine probabilities of events, understanding the concepts of independent and mutually exclusive events. (Bloom's Level: Applying)

CO2. Derive the probability density function of transformed random variables and calculate probabilities,. (Bloom's Level: Analyzing)

CO3. Utilize discrete and continuous probability distributions, including understanding their requirements, calculating mean and variance, and making informed decisions based on probability distributions. (Bloom's Level: Applying)

CO4. Identify the appropriate probability distributions for different statistical situations and apply different distributions to solve simple practical problems, (Bloom's Level: Applying)

CO5: Translate real-world problems into probability models, formulating appropriate probability distributions and applying probability concepts to solve practical problems,. (Bloom's Level: Analyzing)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (Statistics Major)

Course Name: Indian STATnomy (Minor)

Course Code: S2- STAT2T

Course Outcomes: -

CO1 Apply the basic probability rules, such as the addition and multiplication rules, to calculate probabilities of events, demonstrating an understanding of the fundamental principles of probability. (Bloom's Level: Understanding)

CO2 Derive the probability density function of transformed random variables and calculate probabilities using the derived functions, showing the ability to manipulate probability distributions and apply them to solve problems. (Bloom's Level: Applying)

CO3. Use discrete and continuous probability distributions to model and analyze real-world situations, demonstrating an understanding of the characteristics and applications of different probability distributions. (Bloom's Level: Understanding)

CO4. Identify the appropriate probability distribution to use based on the type of statistical situation, recognizing the suitability of different distributions for specific scenarios. (Bloom's Level: Understanding)

CO5. Translate real-world problems into probability models by formulating appropriate probability distributions and applying probability concepts to solve practical problems, demonstrating the ability to analyze and solve probability-related scenarios. (Bloom's Level: Applying)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (Statistics Major)

Course Name: Introduction to Probability Theory

(Open Elective)

Course Code: S2- STAT3T

Course Outcomes: -

CO1 Understan the basic probability rules, such as the addition and multiplication rules. (Bloom's Level: Understanding)

CO2 Derive the probability density function of transformed random variables and calculate probabilities using the derived functions,. (Bloom's Level: Applying)

CO3. Use discrete and continuous probability distributions to model and analyze real-world situations, (Bloom's Level: Understanding)

CO4. Identify the appropriate probability distribution to use based on the type of statistical situation,. (Bloom's Level: Understanding)

CO5. Understand the ability to analyze and solve probability-related scenarios. (Bloom's Level: Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (IInd Year)

Course Name: Statistical Inference

Course Code: 219-I

Course Outcomes: -

CO1: Know the construction of point and interval estimators and evaluate the properties of estimators.

CO2: Demonstrate understanding of the theory of maximum likelihood estimation.

CO3: Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-value.

CO4: Learn to apply non-parametric tests in different real-life situations.

CO5: Describe various sampling distributions.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (IInd Year)

Course Name: Sampling Techniques

Course Code: 219-II

Course Outcomes: -

CO1: Understand the Concepts of population and sample, concepts of survey, sampling error.

CO2: Know the practical issues arising in sampling studies and understand the concepts of bias and sampling variability and strategies for reducing these.

CO3: Understand the principles underlying sampling as a means of making inferences about a population.

CO4: Understand the difference between randomization theory and model-based analysis.

CO5: Be able to analyze data from different sampling schemes and have an appreciation of the practical issues arising in sampling studies.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (IIIrd Year)

Course Name: Applied Statistics

Course Code: 319-I

Course Outcomes: -

CO1: Identify basic knowledge of demographic indicators.

CO2: Recite and accomplish knowledge of measurement of fertility rates.

CO3: Recognize and classify Index Numbers with complete illustration.

CO4: Understand the concepts of time series data with their applications and conclude it.

CO5: Develop and acquires ideas of Demand and Supply.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: B.Sc. (IIIrd Year)

Course Name: SQC and Design of Experiment

Course Code: 319-II

Course Outcomes: -

CO1: Understand and apply Statistical Quality Control.

CO2: Illustrate and Use Sampling Inspection plans for attributes.

CO3: Appropriately interpret results of analysis of variance tests.

CO4: Learn fundamental concepts of design of experiments, completely randomized design and randomized block design. CO5: Design experiments, carry them out, and analyze the data they yield.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Real Analysis

Course Code: S-11

Course Outcomes: -

CO1: Understand and Describe set theory and real numbers.

CO2: Extract and illustrate sequences and series.

CO3: Describe and solve sequence of function and convergence.

CO4: Explain and create knowledge of differentiation. CO5: Define multiple integration and their evaluation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Distribution Theory-I

Course Code: S-12

Course Outcomes: -

CO1: Acquire knowledge of Distribution function.

CO2: Understand discrete distribution with their applications.

CO3: Understand and acquire knowledge of different types of continuous distribution.

CO4: Understand, compare and relate different distributions.

CO5: Understand concept of order statistics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Sampling Techniques

Course Code: S-13

Course Outcomes: -

CO1: Create, describe and understand concept of simple random sampling.

CO2: Create knowledge of stratified random sampling.

CO3: Understand concept of regression estimate and systematic sampling.

CO4: Understand and explain cluster sampling.

CO5: Explain the concept of two-stage sampling and double sampling.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (Ist Sem.)

Course Name: Measure Theory and Probability Course

Course Code: S-14

Course Outcomes: -

CO1: Understand sets, sigma fields, lim. superior, lim. Inferior measures.

CO2: Understand types of measures, random variable, convergence in probability and Measures.

CO3: Understand integration of a measurable function and Analyze Monotone Convergence theorem.

CO4: Analyze Borell-Cantelli lemma, weak and strong law of large number.

CO5: Understand convergence in distribution, characteristics function and Analyze uniqueness theorem.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IInd Sem.)

Course Name: Linear Algebra

Course Code: S-21

Course Outcomes: -

CO1: Demonstrate understanding of vector space and its dimensions.

CO2: Acquire knowledge on Inner product space and linear equations.

CO3: Build and solve linear transformation and matrices.

CO4: Determine Bilinear forms, Quadratic forms, Canonical forms.

CO5: Analyze Eigen Values, Eigen Vectors and characteristics of matrix.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IInd Sem.)

Course Name: Distribution Theory-II

Course Code: S-22

Course Outcomes: -

CO1: Determine two-dimensional distribution function and independence of variable.

CO2: Acquire knowledge on Correlation and regression and Bivariate Normal distribution.

CO3: Interpret and Apply sampling distribution.

CO4: Analyze Non-Central Sampling distribution.

CO5: Understand the distribution arising from the bivariate normal and sampling distribution of correlation coefficient.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IInd Sem.)

Course Name: Statistical Computing

Course Code: S-23

Course Outcomes: -

CO1: Understand Statistics role for national development.

CO2: Understand basic of knowledge of computers.

CO3: Understand, Analyze and use programming in FORTRAN.

CO4: Develop simple programs in FORTRAN.

CO5: Apply statistical package SPSS

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IInd Sem.)

Course Name: Statistical Inference-I

Course Code: S-24

Course Outcomes: -

CO1: Understand characteristics of Good Estimator.

CO2: Acquire knowledge of fundamental paradigm of the foundation of statistical inference.

CO3: Implement different Methods of Estimation.

CO4: Elaborate various concepts related to testing of hypothesis.

CO5: Analyze likelihood Ratio Test.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Multivariate Analysis

Course Code: S-31

Course Outcomes: -

CO1: Understand the concept of multivariate analysis and its properties.

CO2: Evaluate Wishart Distribution.

CO3: Describe null and non-null distribution of sample correlation and regression coefficient.

CO4: Explain Hotelling's T2 statistic and its application.

CO5: Understand the problem of classification and apply the discriminant analysis.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Linear Models

Course Code: S-32

Course Outcomes: -

CO1: Understand Gauss-Markov setup, Interpret best linear unbiased estimation.

CO2: Obtain and Use Variance and Co-variance of Least Square estimates.

CO3: Apply test of Hypothesis for Linear Parametric function.

CO4: Describe one-way random effect, linear models and multiple regression.

CO5: Understand Non-linear models and Multicollinearity.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Operations Research

Course Code: S-33-A

Course Outcomes: -

CO1: Understand the application of Operation Research.

CO2: Understand and solve the concept of L.P.P. and Duality.

CO3: Illustrate and use the Transportation.

CO4: Understand and solve the Integer Linear Programming Problems.

CO5: Interpret and solve Non-Linear Programming Problems.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Demography

Course Code: S-33-B

Course Outcomes: -

CO1: Understand the basic concept of vital statistics and census.

CO2: Illustrate and use the measures of fertility.

CO3: Describe the concept of population estimation.

CO4: Gain knowledge about population projection and matrix representation and use different methods of migration estimation.

CO5: Understand the Poisson process, linear birth and death process.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Programming with Language "C"

Course Code: S-34-A

Course Outcomes: -

CO1: Understand the fundamentals of C programming.

CO2: Understand and use operators and expressions.

CO3: Apply input and output functions.

CO4: Use function, arrays and pointers in C programming.

CO5: Learn to construct statistical programs in C.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Statistical Inference-II

Course Code: S-34-B

Course Outcomes: -

CO1: Understand the concept of Decision theory.

CO2: Apply sequential analysis problems on real life examples.

CO3: Interpret and apply non-Parametric tests.

CO4: Illustrate and Apply test for one sample problems on real life example.

CO5: Understand and Apply tests for two sample problems.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Statistical Techniques

Course Code: OE-ST

Course Outcomes: -

CO1: Summarize Statistics, graphical representation of data and evaluate measures of central tendency.

CO2: Evaluate measures of dispersion, moments, skewness, and kurtosis.

CO3: Understand the concept of probability, its laws and Mathematical expectation.

CO4: Illustrate correlation and regression analysis.

CO5: Apply small sample tests based on t, F and chi-square distributions and design experiments.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Design of Experiments

Course Code: : S-41

Course Outcomes: -

CO1: Understand the concept of Design of Experiment, carry them out and analyze the data they yield.

CO2: Describe and use Analysis of Co-variance.

CO3: Understand the concept of General Block Design.

CO4: Illustrate Balanced Incomplete Block Design.

CO5: Understand and use factorial experiments in real life example.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Statistical Quality Control

Course Code: S-42

Course Outcomes: -

CO1: Understand and use the concept of S.Q.C.

CO2: Solve and use the control charts based on C.V. and V mask.

CO3: Understand and Apply the sampling Inspection Plans.

CO4: Apply Continuous Sampling Plans.

CO5: Understand and Apply the concept of six sigma.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Advanced Operations Research

Course Code: S-43-A

Course Outcomes: -

CO1: Describe and apply the concept of theory of games.

CO2: Understand the goals and objectives of inventory management.

CO3: Understand and use the concept of Replacement Problems.

CO4: Illustrate and use waiting line models (Queuing System).

CO5: Illustrate and Apply the concept of Job sequencing.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Official Statistics

Course Code: S-43-B

Course Outcomes: -

CO1: Interpret the role, function and activities of Indian and international system of statistical organization.

CO2: Understand the role of National Sample Survey organization

CO3: Understand and use the content of population census of India.

CO4: Understand and use the system of collection of Agricultural Statistics

CO5: Describe the relation between Statistics and Industries.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Econometrics

Course Code: S-44-A

Course Outcomes: -

CO1: Identify the nature and scope of econometrics and use of generalized least squares in estimation.

CO2: Explain autocorrelation and multicollinearity

CO3: Use and Apply Canonical Correlation and Discriminant Analysis in economic situations.

CO4: Evaluate simultaneous linear equation models.

CO5: Learn recursive models and simultaneous equation methods.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Programme Name: M.Sc. (IVth Sem.)

Course Name: Stochastic Processes

Course Code: S-44-B

Course Outcomes: -

CO1: Understand the stochastic processes, Markov chains and their application from various sciences.

CO2: Explain branching process and statistical inference in MC and Markov processes.

CO3: Evaluate/apply discrete state space continuous time MC.

CO4: Elaborate Renewal theory and residual lifetime process.

CO5: Analyze Wiener processes as a limit of random walk, stationery process and auto regressive process.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (Zoology Major)

Course Name: Applied Zoology (Major)

Course Code: S1- ZOO1T

Course Outcomes: -

CO1: Recall the importance of systematic taxonomy and phylogenetics in understanding the evolutionary relationships among non-chordate phyla. (Remembering)

CO2: Gain knowledge about the economic, ecological, and medical significance of various animals in human welfare.. (Understanding)

CO3: Apply knowledge of the economic, ecological, and medical roles of different animal species to understand their impact on human well-being and society.. (Applying)

CO4 Analyze the significance of parasites in relation to their impact on host organisms and human health, considering various control measures (Analyzing):.

CO5: Evaluate the effectiveness and ethical implications of different parasite control measures, considering their impact on ZOOh the host and the environment (Evaluating):

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (Zoology Major)

Course Name: Cell Biology, Reproductive Biology and Development Biology (Minor)

Course Code: S1- ZOO 2T

Course Outcomes: -

CO1. Gain a deeper understanding of the fundamental principles and processes underlying life at the cellular level. (Remembering)

CO2. Comprehend the nature and basic concepts of cell biology, reproductive biology, and developmental biology. (Understanding)

CO3. Describe the structure and function of the cell membrane and various cellular organelles. (Understanding)

CO4 Recognize the significance of emerging reproductive trends and reproductive techniques in promoting human welfare. (Understanding)

CO5. Analyze the general patterns and sequential stages of embryogenesis, and comprehend how these processes contribute to the establishment of the body plan in multicellular organisms (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (Zoology Major)

Course Name : Cell biology and Reproductive Biology

(Open Elective)

Course Code: S1- ZOO 3T

Course Outcomes: -

CO1 Describe the structure and functions of the cell membrane and the organization of cellular components. (Remembering)

CO2 Gain a comprehensive understanding of the fundamental aspects of life and its functioning at the cellular level. (Understanding)

CO3. Comprehend the concept of cell division and reproduction, including the various mechanisms and processes involved. (Understanding)

CO4 . Explore the reproductive cycles in organisms and understand the hormonal control mechanisms that regulate reproduction. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (Zoology Major)

Course Name: Cell Biology, Reproductive Biology and Development Biology (Major)

Course Code: S2- ZOO 1T

Course Outcomes: -

CO1. Recall and explain the fundamental principles of life and its cellular processes. (Remembering)

CO2. Understand the basic concepts of cell biology, reproductive biology, and developmental biology. (Understanding)

CO3 Analyze the structure and function of the cell membrane and various cellular organelles. (Applying)

CO4. Evaluate the significance of the latest trends and reproductive techniques for human welfare. (Analyzing)

CO5 Examine the evolutionary development of various animal species and understand the underlying processes and factors involved. (Evaluating)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (Zoology Major)

Course Name: Applied Zoology (Minor)

Course Code: S2- ZOO 2T

Course Outcomes: -

CO1. Gain an understanding of the significance of systemic taxonomy and phylogenetics in comprehending the evolution of non-chordate phyla. (Remembering)

CO2 Comprehend the diverse morphological, anatomical structures, and functions of animals belonging to different phyla**,(** Understanding)

CO3. Acquire knowledge about the economic, ecological, and medical importance of various animals in relation to human welfare. (Understanding)

CO4. Grasp the significance of parasites and their control measures in maintaining the health and well-being of organisms. **(** Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (Zoology Major)

Course Name: Development Biology and Reproductive Techniques (Open Elective)

Course Code: S2- ZOO 3T

Course Outcomes: -

CO1: Gain an understanding of the importance of embryology, including the different stages of embryonic development and the process of fertilization. (Remembering)

CO2: Comprehend the embryonic development and metamorphosis of frogs and cheek cells. (Understanding)

CO3: Enhance learning by exploring advanced reproductive technique. (Understanding)

CO4: Develop a comprehensive understanding of the in vitro fertilization (IVF) process. (Understanding)

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (IInd Year)

Course Name: Vertebrates & Evolution

Course Code: 220-I

Course Outcomes: -

C01: Able to identify the vertebrates with the help of Parker and Haswell classification.

C02: Gain knowledge of functional and comparative anatomy of different systems of vertebrate's form fishes to mammals.

C03: Understand process of fossilization with analyse the age of fossils and study of extinct form Dinosaurs and Archeopteryx.

C04: Understand of different kind of evolution and Modern synthetic theory of evolution.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (IInd Year)

Course Name: Animal Physiology and Biochemistry

Course Code: 220-II

Course Outcomes: -

C01**:** Co-relate physiological and Biochemical Process.

C02: Understand various physiological system and their importance.

C03: Apply the knowledge to healthy life. C04: Impart knowledge about various endocrine glands.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (IIIrd Year)

Course Name: Genetics

Course Code: 320-I

Course Outcomes: -

C01: Gain knowledge human genetics and heredity.

C02: Understand Role of genes in protein synthesis.

C03: Familiar with tools and techniques of biotechnology for research. C04: Study of different instruments.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: B.Sc. (IIIrd Year)

Course Name: Ecology and Applied Zoology

Course Code: 320-II

Course Outcomes: -

C01: Gain knowledge of wild life conservation and management.

C02: Understand the ecology and environment. C03: Understand the application of biological Science in Aquaculture prawn culture sericulture and lac culture.

C04: To impart knowledge about biodiversity.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Biosystematics, Taxonomy and Evolution

Course Code: Z-11

Course Outcomes: -

CO1: Gain Knowledge and Understanding of – 1 Classification of animals on the basis of their relation to other Animals by body structure & external characters and Dimension of Speciation.

CO2: apply the principles and techniques for Taxonomic procedures. and international rules of Nomenclature to give a scientific name to animals.

CO3: Apply biological Indices in research purpose. CO4: Understand Concepts and theory of Organic Evolution. CO5: Connect lower to higher vertebrates with the help of Evolution.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology
Programme Name: M.Sc. (Ist Sem.)

Course Name: Structure and Function of Invertebrates

Course Code: Z-12

Course Outcomes: -

CO1: Gain Knowledge and Understanding of - 1 Structure and organization of invertebrate animals. CO2: Modifications in various functions of animals during transition from lower Invertebrates to higher vertebrates.

CO3: Mechanism of Osmoregulation in Invertebrates.

CO4: Primitive and Advanced nervous system in Invertebrates. CO5: Significance of larval forms of invertebrates.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Quantitative Biology, Biodiversity and Wildlife

Course Code: Z-13

Course Outcomes: -

CO1: Explain biostatical tools for data analysis and its importance in research work.

CO2: Explain wildlife trade that may enhance the Economy. CO3: Describe wildlife legislation will systematically organize the understanding of wildlife conservation and management.

CO4: Evaluate Biodiversity including causes for the loss of Biodiversity and data.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (Ist Sem.)

Course Name: Biomolecules and Structural Biology

Course Code: Z-14

Course Outcomes: -

CO1: Allow the student to gain knowledge about various bio molecules and their role in metabolism. CO2: Explain Structure and functional importance of DNA and RNA.

CO3: Describe Carbohydrates and Fat metabolism.

CO4: Illustrate Mechanism of Enzymes and Principles of thermodynamics.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IInd Sem.)

Course Name: General and Comparative Animal Physiology and Endocrinology

Course Code: Z-21

Course Outcomes: -

CO1: Impart knowledge about various metabolic and physiological Mechanism of the human body. CO2: Gain knowledge of Comparative study of different Receptors.

CO3: Deeper understanding of Hormones, Pheromones, Chromatophores and Bioluminescence.

CO4: Study of Various Endocrine glands and Hormones and Reproduction.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Population Ecology and Environmental Physiology

Course Code: Z-22

Course Outcomes: -

CO1: Understand Populations, their characteristics and regulation of population.

CO2: Correlating physiological adaptations to environment and pollution, control measures for environmental degradation.

CO3: Explain limiting factors, predator-prey relationships and physiological responses of the body to environment.

CO4: Understand Environmental Hazards as well as risk factors to human health.

CO5: Analyse Concept of homeostasis and methods of relaxation of Stress of body by Yoga, and Meditation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Tools and Techniques in Biology

Course Code: Z-23

Course Outcomes: -

CO1: Get the Knowledge and Understanding of basic principles, working and Applications of - Microscope, Colorimeter, Chromatography and related instruments.

CO2: Demonstrate Microbiological, Cytological, Histological, Molecular biological techniques.

CO3: Understand basic principles, application and types of Radioactivity, demonstrate Immunological Surgical Immunodetection techniques.

CO4: Learn different mode of application of microtome and cell culture techniques.

CO5: Be familiarized to cytological and molecular biological techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IInd Sem.)

Course Name: Molecular Cell Biology and Genetics

Course Code: Z-24

Course Outcomes: -

CO1: Understand Molecular, structural and functional aspects of Bio membrane.

CO2: Describe Cell communication in Molecular and compare different types of Signalling.

CO3: Describe properties of biomolecules that have important in cell adhesion.

CO4: Illustrate genome organization and Various type of gene and genetic disorder.

CO5: Acquire a broad understanding of current Molecular genetics that help in research.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Comparative Anatomy of Vertebrates

Course Code: Z-31

Course Outcomes: -

CO1: Explain the relationships among animals with their internal developments.

CO2: Describe Comparative study of heart, and blood circulation in vertebrates.

CO3: Describe Comparative study of different organ system in vertebrates.

CO4: Summarize Anatomical adaptations in vertebrates.

CO5: Explain General organization of cyclostomes and gnathostomes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Eco-toxicology

Course Code: Z-32

Course Outcomes: -

CO1: Summarize general principles and factors of Eco system.

CO2: Illustrate Process of Recycling of solid and liquid wastes.

CO3: Explain Different type of environmental pollution.

CO4: Relate Public health hazards with environmental disasters. CO5: Explain Effect of pesticides on environment.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Immunology

Course Code: Z-33-B

Course Outcomes: -

CO1: Explain general principles of Immunology, history, and different types of immunity.

CO2: Understand structure and function of primary and secondary lymphoid organ, factors that govern immune response.

CO3: Summarize fundamentals and applications of Immunoglobulin , major histocompatibility complex.

CO4: Explain Hypersensitivity and Immunization. CO5: Illustrate principles of advanced immunology both at molecular and cellular level.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Limnology

Course Code: Z-33-A

Course Outcomes: -

CO1: Impart their knowledge of Limnology in Fishery science.

CO2: Gain hands on field and laboratory experiences use in their research work.

CO3: Relate understanding of how living organisms survive and interact in aquatic environment.

CO4: Correlate, analyse, interpret and report Limnological Data.

CO5: Classify water pollution and control measures. CO6: Explain legislation and regulation on discharge of Industrial effluent and domestic water, rivers and reservoirs.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Basic of Bioinformatics

Course Code: – OE-BB

Course Outcomes: -

CO1: Understanding of Basic of Bioinformatics and Biological database.

CO2: Explain Sequence Alignments. CO3: Describe structural Bioinformatics.

CO4: Explain motif and Domain database, phytogenic analysis. CO5: Describe system biology.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Aquaculture

Course Code: Z-34-A

Course Outcomes: -

CO1: Detailed understanding of Aquaculture with special reference to Fishery sciences.

CO2: Acquire in depth knowledge about different Fresh water culture [Fish, prawn, mussel and frog]. CO3: Gain knowledge of advanced techniques used in fish culture.

CO4: Correlate their knowledge of aquaculture with marketing and transport of fish.

CO5: Describe how to prepare Fish form. CO6: Learn about fish preservation techniques.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IIIrd Sem.)

Course Name: Cellular Organization and Molecular Organization

Course Code: Z-34-B

Course Outcomes: -

CO1: Gain knowledge of new and novel application to solve biomedical problems.

CO2: Describe cytochemistry of some organelles.

CO3: Explain application of DNA technology.

CO4: Illustrate concept of normal cells and cancer cells, Genetic basis of cancer cells.

CO5: Describe Eradication of human cancer. CO6: Understanding of tumour suoressor genes, human papillovirus and its vaccine.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IVth Sem.)

Course Name: - Animal Behaviour and Neurophysiology

Course Code: Z-41

Course Outcomes: -

CO1: Explain comprehensive understanding of behaviour of animals.

CO2: Understanding of adaptive significance of behaviour emphasising , territoriality, animal communication, social behaviour, sexual selection and mating system.

CO3: Describe Biological rhythms, learning and memory.

CO4: Describe concept of Thermoregulation.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Gamete Biology, Development and Differentiation

Course Code: Z-42

Course Outcomes: -

CO1: Understand theories of Gamete biology, Gametogenesis and Biochemistry of Fertilization.

CO2: Develop a deep knowledge of the role of endocrine secretion in regulation of reproductive cycle. CO3: Explain Hormonal regulation of ovulation, mammary gland.

CO4: Understand Cell commitment and differentiation, frog and chic embryology.

CO5: Develop a knowledge of cryopreservation technique and stem cell disorders.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IVth Sem.)

Course Name: – Ichthyology (Fish Structure and Function)

Course Code: Z-43-A

Course Outcomes: -

CO1: Distinguish Families and higher taxonomic groups of fishes with respect to their physical factors. CO2: Explain functional anatomy of respiratory organs and weberian ossicles.

CO3: Illustrate knowledge of Excretory, luminous and Acoustic system of fishes.

CO4: Describe adaptation in Hill stream and Deep-Sea fishes. CO5: Explain concept of Parental care in fishes.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Pisci Culture and Economic Importance of Fishes (Ichthyology)

Course Code: Z-44-A

Course Outcomes: -

CO1: Impart the knowledge of different methods of fish breeding.

CO2: Describe importance of managements of ponds for fish culture.

CO3: Understanding of prawn, pearl and composite fish culture.

CO4: Clear understanding of offshore, coastal and deep-sea fishery.

CO5: Illustrate role of Fisheries in Rural Development and Fishery resources of MP and INDIA.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Biology of Parasites

Course Code: Z-43-B

Course Outcomes: -

CO1: Identify selected protozoans their structure, life cycle, treatment and control for human welfare. CO2: Appraise the impacts of parasitic diseases on Human Societies.

CO3: Understand Structure, life cycle, pathogenicity, treatment and control of Cestode Parasites viz-Diphyllobothrium, Taenia, Hymenolepis and Echinococcus.

CO4: Explain Basic features and characteristics of hosts.

CO5: Describe Major means of transmission of parasites stool examination and its significance.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Zoology

Programme Name: M.Sc. (IVth Sem.)

Course Name: Cell biology

Course Code: Z-44-B

Course Outcomes: -

CO1: Understand and knowledge of basic and advanced feature of eukaryotic chromosomes, DNA methylation and significance of heterochromatin.

CO2: Explain Structural organization and evolution of various kinds of eukaryotic genes, and significance of gene families.

CO3: Summarize the knowledge of DNA transcription apparatus, zinc finger steroid receptors, domains.

CO4: Impart knowledge of DNA rearrangement, mechanism of programmed cell, ageing and senescence.

CO5: Develops clear understanding on various stages of development in Drosophila and significance of genes.

Link for Cos of II Year and III Year and PG Programme: - Click Here