BA / BSc / MA / MSc- Course Outcomes

On completion of the undergraduate/postgraduate program, the student is expected to achieve the following course outcomes:

Department of Mathematics

T.Y.B.Sc Mathematics

UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

Effective from June 2020-2021

- Course Objectives (CO's)
- Programming Outcomes (PO's)
- Mapping between CO's & PO's

Semester-Vth

1)MTH - 501: Metric Spaces.

Course objectives: (CO's)
1. Introduction of metric as a generalization of distance function and basic concepts in metric spaces.
2. To explain the concept of sequence and complete metric space with their properties.
3. To discuss compactness, and sequential compact spaces and their properties along with continuity.

Programming outcomes: (PO's)
After studying this course, student should be able to:
1. Understand the Euclidean distance function on A_B and appreciate its properties, and state and use the Triangle and Reverse Triangle Inequalities for the Euclidean distance function on A_B
2. Explain the definition of continuity for functions from A_B to A_D and determine whether a given function from A_B to A discontinuous
3. Explain the geometric meaning of each of the metric space properties (M1) – (M3) and be able to verify whether a given distance function is a metric
4. Distinguish between open and closed balls in a metric space and be able to determine them for given metric spaces
5. Define convergence for sequences in a metric space and determine whether a given sequence in a metric space converges

6. State the definition of continuity of a function between two metric spaces.

Mapping between CO's & PO's: -

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	-	3	3	-	-
CO2	-	-	-	-	3	-
CO3	-	3	-	-	-	3

Scale: (3=high correlation, 2=medium, 1=low)

2)MTH - 502: Real Analysis –I

Course objectives: (CO's)

1. To study the Riemann Integration.
2. To study the Mean value theorems of integral calculus
3. To study Improper integrals with finite limit and infinite limit
4. To study the concept of Riemann integration and its properties.
5. To study Beta and Gamma Integrals

Programming outcomes: - (PO's)

After successful completion of this course, students are expected to:

1. Understand the structure of Riemann Integration
2. Represent lattice in diagrammatic form.
3. Understand the Improper integrals with finite limit and infinite limit their properties.
4. Learn the concepts of Beta and Gamma Integrals.

Mapping between CO's & PO's: -

	PO1	PO2	PO3	PO4
CO1	3	0	0	0
CO2	2	0	1	0
CO3	0	0	3	0
CO4	3	0	0	0
CO5	0	0	0	3

Scale: (3=high correlation, 2=medium, 1=low, 0=none).

3)MTH - 503: Algebra

Course objectives: (CO's)
1) To gain the basic concepts of groups like subgroups, normal, isomorphism of groups.
2) To understand basic concepts of rings like ideals, isomorphism of rings and polynomial rings.

Programming outcomes: (PO's)
After successful completion of this course, students are expected to:
1) know the use Permutation Groups
2) know normal Subgroups and group isomorphisms
3) Know Ideals in rings, Quotient Rings and Isomorphism of Rings
4) Know polynomial Rings and irreducibility of polynomials

Mapping between CO's & PO's: -

Course Objectives (COs)	PO 1	PO 2	PO 3	PO 4
CO 1: Basic concepts of groups	2	3	0	0
CO 2: Basic concepts of rings & polynomial rings	0	0	3	3

Scale (3=Strong correlation, 2=Moderate, 1=Slight, 0=None):

4)MTH - 504: Lattice Theory

Course objectives: (CO's)

1) To study the structure of poset and lattice.
2) To study the diagrammatic representation of lattice.
3) To study the terms Maximal element, Minimal element, Greatest element, Least elements.
4) To study the concept of ideals and its properties.
5) To study homomorphism of lattices.
6) To study modular and distributive lattice and their inter-relation.

Programming outcomes: (PO's)

After completing this syllabus students will able to
1) Understand the structure of poset and lattice.
2) Represent lattice in diagrammatic form.
3) Understand the terms Maximal element, Minimal element, Greatest element, Least elements.
4) Learn the concepts of ideals and their properties.
5) Learn the concepts of homomorphism.
6) Understand modular and distributive lattice and their interrelation.

Mapping between CO's & PO's: -

COs / Pos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	
CO1 (Structure of Poset/Lattice)	3	2	-	-	-	-	
CO2 (Diagrammatic Representation)	3	3	-	-	-	-	
CO3 (Extremal Elements)	3	3	-	-	-	-	
CO4 (Ideals & Properties)	3	2	-	-	-	-	
CO5 (Homomorphism)	3	2	-	-	-	-	

CO6 (Modular & Distributive)	3	3	-	-	-	2	

Scale: 1-Low, 2-Medium, 3-High

5)MTH - 505: Integral Transforms

Course objective; (CO's)

1. To gain a facility with using the transform, both specific techniques and general principles, and learning to recognize when, why, and how it is used.
2. Together with a great variety, the subject also has a great coherence, and the hope is students come to appreciate both.

Programming outcomes: (PO's)

1. Know the use of Fourier transform in Wave equation,
2. Solve Boundary Value Problems, also problem on Heat-flow in semi-infinite bar.
3. Use Fourier transform in communication theory and signal analysis, image processing and filters, data processing and analysis, solving partial differential equations for problems on gravity.
4. Students will be able to use Z-transform in the characterization of Linear Time-Invariant system (LTI), in development of scientific simulation algorithms.

Mapping between CO's & PO's: -

Course Objective (CO)/ Programming Outcomes	**PO1**	**PO2**	**PO3**	**PO4**
CO1	3	3	3	3
CO2	2	1	1	1

Scale: 1-Low, 2-Medium, 3-High correlation

6)MTH – 506(B): Number Theory

Course objectives: (CO's)
To study prime numbers and Diophantine equations, Theory of congruence's, Perfect numbers, Fibonacci sequence and finite continued fractions.

Programming outcomes: (PO's)
1) solve Diophantine equations
2) use Fermat's theorem, Euler's theorem and Wilson's theorem for finding remainders
3) understand perfect, Mersenne and Fermat's numbers.
4) understand Fibonacci sequence
5) solve Diophantine equations by using finite continued fractions.

Mapping between CO's & PO's: -

	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1		1
CO2	1	1		1	
CO3			1		
CO4				1	1

Note: Here a '1' indicates a direct correlation.

7)MTH – 507: Practical Course based on (MTH-501& MTH-502)

Course objectives: (CO's)

• To develop analytical and computational skills
• To get hands on training for solving problems of Metric spaces and Riemann integrals.

Programming outcomes: (PO's)

After successful completion of this course, students are expected to:
• Students will develop problem solving problems on metric spaces and Riemann integrations.

Mapping between CO's & PO's: -

Course Objective / Programming outcomes	PO
CO1	3
CO2	3

Mapping Level: 3 (High Correlation)

8)MTH – 508: Practical Course based on (MTH-503 & MTH-504)

Course objectives: (CO's)

• To develop analytical and computational skills
• To get hands on training in solving problems of groups, rings and Lattice Theory.

Programming outcomes: (PO's)

After successful completion of this course, students are expected to:

• develop problem solving skills

Mapping between CO's & PO's: -

Course Outcomes	PO1	PO2	PO3	PO4
CO1: Understand structures	3	2	-	-
CO2: Apply Lattice Theory	3	2	1	-
CO3: Analytical Skills	2	3	2	1
CO4: Computational/Problem Solving	2	3	3	2

Scale: 1-Low, 2-Medium, 3-High correlation.

9)MTH – 509: Practical Course based on (MTH-505, MTH- 506(B))

Course objectives: (CO's)

• To develop analytical and computational skills
• To get hands on training in solving problems of Integral Transforms and either in C Programming or Number Theory.

Programming outcomes: (PO's)

After successful completion of this course, students are expected to:
• develop problem solving skills
• develop computer programs for problems of number theoretic problems.

Mapping between CO's & PO's: -

COs	PO1	PO2	PO3	PO4	PO5
CO1 (Integral Transforms)	3	2	2	-	-
CO2 (Computational/C Prog)	2	2	3	1	3
CO3 (Hands-on Training)	2	2	3	2	3

Mapping strength: 3 = Strong, 2 = Moderate, 1 = Low, "-" = No correlation.

Semester-VI

1)MTH - 601: Measure Theory

Course objectives: (CO's)
The aim of this course is to learn the basic elements of Measure
Theory. It is useful as it provides a foundation for many branches of mathematics such as harmonic analysis, theory of partial differential equations and probability theory.
Programming outcomes: (PO's)
1) Learn measurable sets. Learn the concept of Sets of measure zero.
2) Understand why a more sophisticated theory of integration and measure is needed.
3) Show that certain functions are measurable.
4) Understand properties of the Lebesgue integrals.

Mapping between CO's & PO's: -

Course Objective (CO)	PO 1	PO 2	PO 3	PO 4
CO 1: Learn the basic elements of Measure Theory.	3	3	3	3

Mapping Level: 3 (High Correlation)

2)MTH - 602: Real Analysis – II

Course objectives: (CO's)

1. To study Sequence of real numbers, series function.
2. To study of Fourier series. Theory of Uniform convergence of sequence of functions and Cauchy's criteria for uniform con. of sequence of function.

Programming outcomes: (PO's)

After successful completion of this course, students are expected to:

1. solve Convergence and divergence
2. use Test for absolute convergence,
3. understand Fourier series for even and odd functions t,
4. understand Sine and cosine series in half range

Mapping between CO's & PO's: -

Course Outcome (CO)	PO1: Engineering Knowledge	PO2: Problem Analysis	Other Relevant POs (e.g., PO12)
1. Solve Convergence and divergence	3	2	1 (PO12)
2. Use Test for absolute convergence	3	2	1 (PO12)
3. Understand Fourier series for even and odd functions	2	1	1 (PO12)
4. Understand Sine and cosine series in half range	2	1	1 (PO12)

Scale: 1-Low, 2-Medium, 3-High correlation

3)MTH - 603: Linear Algebra

Course objectives: (CO's)

1) To study vector spaces, basis and dimensions.
2) To study Linear transformation also Eigen value and eigen values
3) To study diagonalization of matrices, congruences, Perfect numbers,

Programming outcomes: (PO's)

After successful completion of this course, students are expected to:

1) solve Rank and nullity theorem
2) use Cayley Hamilton theorem, Euler's theorem and finding Eigen values and Eigen vectors of linear transformation.
3) understand Kernel and image of linear transformations.
4) understand Singular and non-singular linear transformations

Mapping between CO's & PO's: -

Course Objectives (COs)	PO1	PO2	PO3	PO4
CO1: To study vector spaces, basis and dimensions	3	--	3	2
CO2: To study Linear transformation also Eigen value and eigen values	2	3	3	3
CO3: To study diagonalization of matrices, congruences, Perfect numbers	3	3	--	1

Scale: 1-Low, 2-Medium, 3-High, "--" indicates no correlation.

4)MTH - 604: Ordinary and Partial Differential Equations

Course objectives: (CO's)
The main objective of this course is to provide the student with an understanding of the solutions and applications of ordinary differential equations. By using this theory and models students can apply their knowledge in real world.

Programming outcomes: (PO's)
1) Know the exact differential equation and its solution.
2) Solve the exact differential equations by using integrating factor.
3) Solve the linear differential equation of second order by using various methods.

CO-PO Mapping Matrix:

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6
CO1: Identify and solve exact differential equations.	3	2	-	-	-	-
CO2: Solve exact differential equations using integrating factors.	3	3	1	-	-	-
CO3: Solve linear differential equations of second order using various methods (e.g., operator method, variation of parameters).	3	3	2	-	-	-

Scale: 1-Low, 2-Medium, 3-High correlation.

5)MTH - 605: Graph Theory

Course objective: (CO's)
1. The course is oriented to those who want to advance structured and procedural programming understating and to improve operation on graphs.
2. The major objective is to provide students with understanding of graph, Trees. Matrix representation of graphs.

Programming outcomes: (PO's)
After successful completion of this course, students are expected to:
1. Understanding a functional hierarchical code organization.
Ability to define and manage graphs, connected graphs.
2. Understanding a concept of Cut set and cut vertices.

CO-PO Mapping Matrix:

Course Outcome (CO)	Description	Mapping (PO)	Level
CO1	Advance structured/procedural programming and improve operation on graphs.	**PO1, PO2, PO5**	High
CO2	Understand graphs, trees, and matrix representations.	**PO1, PO2**	High
CO3	Define and manage graphs, connected graphs.	**PO1, PO3**	Med
CO4	Understand the concept of Cut sets and cut vertices.	**PO1, PO2**	Med

6)MTH – 606(B): Operations Research

Course objectives:(CO's)

1. To study linear programming problem (LPP).
2. To study the simplex method to solve linear programming problem.
3. To study the simplex method for unbounded, alternative and infeasible solutions of LPP.
4. To study the initial basic feasible solution of transportation problem (TP).
5. To study the saddle point, maximin-minimax principal, two person zero sum game.
6. To study 2 s 2 games without saddle point.
7. To study graphical method to solve µ s 2 and 2 s } games.
8. To study dominance property.

Programming outcomes: (PO's)

After successful completion of this course, students are expected to:

1. solve the linear programming problem by graphical method and simplex method.
2. learn the unbounded, alternative and infeasible solutions of LPP by graphical and simplex method.
3. understand the standard and canonical form of LPP.
4. find the optimal solution of TP by MODI method.
5. solve the solution of assignment problems by Hungerian Method.
6. Understand the unbalanced, balanced, maximization, restricted AP and alternative solution of AP.
7. understand the saddle point, maximin-minimax principal, two person zero sum game.
8. use of dominance property to find the solution games

CO-PO Mapping Matrix :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3					
CO2	3	3	2					
CO3		3						
CO4				2				
CO5							3	
CO6							3	
CO7							3	
CO8								3

Scale: 1-Low, 2-Medium, 3-High correlation.

7)MTH – 607: Practical Course based on (MTH-601, MTH-602)

Course objectives: (CO's)
• To develop analytical and computational skills
• To get hands on training for solving problems of measure theory and sequences and series of functions in Real analysis.

Programming Outcomes: (PO's)
After successful completion of this course, students are expected to:
• Students will develop problem solving skills

CO-PO Mapping Matrix:

Course Outcome	**PO1: Problem Solving Skills**
CO1 (Analytical & Computational Skills)	**3**
CO2 (Measure Theory/Real Analysis Problems)	**3**

Mapping Level: 3 (High Correlation)

8)MTH – 608: Practical Course based on (MTH-603 & MTH-604)

Course objectives: (CO's)
• To develop analytical and computational skills
• To get hands on training in solving problems of linear spaces and ordinary as well as partial differential equations.
Programming outcomes: (PO's)
After successful completion of this course, students are expected to:
• Understand basics of vector spaces and method of solving differential equations.

CO-PO Mapping Matrix:

CO	PO1	PO2	PO5
CO1 (Linear Spaces)	3	2	1
CO2 (ODEs)	3	3	2
CO3 (PDEs)	3	3	2

Scale: 1-Low, 2-Medium, 3-High correlation.

9)MTH – 609: Practical Course based on (MTH-605, MTH- 606(B))

Course Outcomes (COs)

- **CO1:** Develop analytical and computational skills for graph theory problems.
- **CO2:** Gain hands-on training in solving graphs using SciLab or Operations Research.

Program Outcomes (POs)

- **PO1:** Engineering Knowledge
- **PO2:** Problem Analysis
- **PO3:** Design/Development of Solutions
- **PO4:** Conduct Investigations of Complex Problems
- **PO5:** Modern Tool Usage

CO-PO Articulation Matrix (Mapping):

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	1
CO2	2	3	3	3	3

Scale: 1-Low, 2-Medium, 3-High correlation.

Master of Science (Mathematics)

M.Sc.-I Part (Semester I, II)

(As per NEP-2020 Pattern)
With Effect from 2023-2024

- Course Objectives (CO's)
- Programming Outcomes (PO's)
- Mapping between CO's & PO's

By Prof. Amrin Shaikh

Semester-I

1)MT-411 Advanced Real Analysis:

Course Objectives: (CO's)
1. To know the fundamental knowledge of measure theory.
2. To study Countable sets, Zorn's lemma, Well Ordering principle, Vitali covering theorem (lemma), Fundamental theorem for integral calculus for Lebesgue integral.
3. To know Measurable sets and Measurable functions and their applications.

Programming Outcomes: (PO's)
On completion of this course, the student will be able to:
1. Understand Lebesgue outer measure, Riemann and Lebesgue integrals.
2. Explain the Schroeder- Bernstein theorem, Cantors theorem and the continuum Hypothesis, Lebesgue differentiation theorem.
3. Learn the concept of Functions of bounded variation, differentiation of monotone function.

Mapping between CO's & PO's:

	PO1	PO2	PO3
CO1	3	1	0
CO2	2	3	0
CO3	3	2	1

Scale: 3 (Strong), 2 (Moderate), and 1 (Weak/Slight correlation).

2) MT-412 Programming in C++:

Course Objectives: (CO's)

1. To understand how C++ improves C with object-oriented features.
2. To learn how to write inline functions for efficiency and performance.
3. To learn how to design C++ classes for code reuse and to learn how to overload functions and operators in C++.

Programming Outcomes: (PO's)

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

1. Visualize the features of C++ supporting object-oriented programming.
2. Construct how to produce object-oriented software using C++.
3. Survey the major object-oriented concepts to implement object-oriented programs in C++, encapsulation, inheritance and polymorphism.

Mapping between CO's & PO's:

Course Objectives (COs) / Programming Outcomes (POs)	PO1	PO2	PO3
CO 1	3	1	2
CO 2	-	2	-
CO 3	2	3	3

Scale: 3 (Strong), 2 (Moderate), and 1 (Weak/Slight correlation)

3) MT-413 Topology:

Course Objectives: (CO's)

1. Students will learn the concept of topology, topology generated by basis.
2. Students will learn, subspaces, closed sets, limit points of a set.
3. Students will learn continuous functions on topological spaces, product topology, metric topology.
4. Students will learn connectedness of a set, compactness and separation axioms.

Programming Outcomes: (PO's)

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

1. Understand the definition of topology, examples, basis, order topology.
2. Understand the subspaces, closed sets, limit points of a set.
3. Understand continuous functions on topological spaces, product topology, metric topology.
4. Understand connectedness of a set, compactness and separation axioms.

Mapping between CO's & PO's:

Course Objectives (COs)	PO1	PO2	PO3	PO4
CO1	3			
CO2		3		
CO3			3	
CO4				3

Scale- Here 3 indicate high correlation.

4) MT-414 Abstract Algebra:

Course Objectives: (CO's)

1. To know the concept and applications of Finite groups.
2. To study well known theorems for finite groups: Cauchy's Theorem, Sylow's Theorem, Jordan - Holder Theorem.
3. To know concepts of particular types of integral domains: ED, PID, UFD.

Programming Outcomes: (PO's)

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

1. Understand class equation for finite groups and its applications.
2. Explain Sylow theory and solvable groups.
3. Learn Euclidean domains, Principal ideal domains, unique factorization domains, Noetherian rings and the Hilbert Basis Theorem.

Mapping between CO's & PO's:

Course Outcomes (COs) / Programming Outcomes (POs)	**PO1**	**PO2**	**PO3**
CO1	3	2	1
CO2	2	3	1
CO3	1	2	3

Scale: 3 (Strong), 2 (Moderate), and 1 (Weak/Slight correlation)

5) MT-415(A) Partial Differential Equations:

Course Objectives: (CO's)

1. To understand the concepts and applications of differential equations.
2. To improve problem solving and logical thinking abilities of students.
3. To use the concepts of Differential equations to develop mathematical skills.

Programming Outcomes: (PO's)

Student will be able to

1. Find solutions of partial differential equations and determine the existence, uniqueness of solution of partial differential equations.
2. Apply the concepts of partial differential equations to solve problems in allied fields.
3. Know the important theorems and their applications.

Mapping between CO's & PO's:

CO/PO	PO1	PO2	PO3
CO1	3	2	3
CO2	3	3	2
CO3	2	3	2

Scale- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

6) RM-417 Research Methodology:

Course Objectives: (CO's)

To make the students familiar with,

1. To learn the basics of science, scientific research and its importance.
2. To learn the Ethics and plagiarism precautions to be taken while doing research.
3. To understand the detailed referencing and literature review procedure before beginning the research.
4. To understand the process of writing research papers, research project report and research proposal.
5. To learn various advanced tools useful for the science and aware about the laboratory safety.

Programming Outcomes: (PO's)

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

1. Understand the basic concept of science and scientific research.
2. Learn and follow the ethical guidelines while doing research avoid plagiarism in research publications.
3. Write a comprehensive literature review on a given research topic.
4. Write a crisp research proposal or research project independently.
5. Learn most advanced chemistry tools for the efficient research work.
6. Acquire knowledge about various hazardous chemical handling procedures and implement it while working in the laboratory.

Mapping between CO's & PO's:

Course Objective (CO)	Programming Outcome (PO)	Correlation Level
CO1	PO1	3 (Strong)
CO2	PO2	3 (Strong)
CO3	PO3	3 (Strong)
CO4	PO4	3 (Strong)

Scale: Here 3 indicate high correlation.

Semester – II

1)MT-421 Complex Analysis:

Course Objectives: (CO's)
1. To make student aware of advances in complex analysis.
2. To know Mobius transformation and conformal mappings.
3. To Improve the logical thinking ability to find applications.

Programming Outcomes: (PO's)
On completion of this course, the student will be able to:
1. Acquire useful knowledge of complex analysis
2. understand the concept of power series about complex analysis
3. solve the complex integration in various forms
4. gain the knowledge of singularities
5. prepare themselves for competitive examinations: SET, NET, GATE etc.

CO-PO Mapping Matrix:

CO's/PO's	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3
CO2	3	1	1	1	2
CO3	2	2	3	2	3

Scale (1: Low, 2: Medium, 3: High correlation.)

2)MT-422 Python Programming:

Course Objectives: (CO's)

1. To acquire proficiency in using different functions and capabilities of Python.
2. To learn how to write loops and decision statements in Python.
3. To demonstrate the use of Python for plotting.

Programming Outcomes: (PO's)

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

1. Acquire skill in Python package particularly basics of Python.
2. Represents data with the help of plotting in Python.
3. Create an application with the support of graphics in Python.

Mapping between CO's & PO's:

CO's/PO's	PO1	PO2	PO3
CO1	3	-	-
CO2	3	-	-
CO3	1	3	2

Scale (1: Low, 2: Medium, 3: High correlation.)

3)MT-423 Analytic Number Theory:

Course objectives: (CO's)
1. To know concept of arithmetic functions.
2. To study congruences and quadratic residues.
3. To know the concepts of primitive root theory.

Programming Outcomes: (PO's)
On completion of this course, the student will be able to:
1. Understand the concept of Mobius function, The Euler totientfunction , Mangolt function, Liouvilles function, The divisor function, Bell series.
2. Explain Residue classes, Lagrange's theorem and its applications, Polynomial congruences with prime power moduli.
3. Learn Quadratic residues, existence and non-existence of primitive roots.

CO-PO Mapping Matrix:

CO's/PO's	PO 1	PO 2	PO 3
CO 1	3	2	-
CO 2	3	3	2
CO 3	3	2	2

Scale (1: Low, 2: Medium, 3: High correlation.)

4)MT-424 Linear Algebra:

Course Objectives: (CO's)

1. To develop skills and to acquire knowledge of Linear Algebra, Rings and Modules.
2. To prepare students for further courses in mathematics and/or related disciplines (e.g. Commutative algebra, homological algebra, etc.).
3. To develop the ability to demonstrate underlying principles of the subject and the ability to solve unseen mathematical problems.

Programming Outcomes: (PO's)

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

1. Understand and interpret the concepts of modules and submodules, Homomorphism and isomorphism in modules, types of modules and group theorem.
2. Understand the concepts of Jordan and Rational canonical forms and use them to solve problems involved in matrix theory and computer algebra.
3. Understand the concepts of Local rings and modules, Noetherian modules, Primary decomposition for modules.

CO-PO Mapping Matrix:

CO's/PO's	PO1	PO2	PO3
CO1	3	2	2
CO2	2	3	3
CO3	2	3	2

5)MT-425(A) Theory of Special Functions:

Course Objectives: (CO's)

1. To analyse properties of special functions by their integral representations and symmetries.
2. To determine properties of Legendre polynomials, Rodrigue's formula, Generating function and Fourier Legendre's series which may be solved by application of special functions.
3. To determine properties of solution of Bessel's differential equation and Bessel's functions, Bessel's function of first kind and second kind, Orthogonality of Bessel's functions, The Hypergeometric Functions.
4. Study of Hypergeometric series, Euler's Integral Representation, the Hypergeometric equation, the Barnes Integral for the Hypergeometric function.

Programming Outcomes: (PO's)

Student will be able to:

1. list the basic concept of integral calculus and special functions of various engineering problem and to know the application of some basic mathematical methods via all these special functions.
2. Explain the applications and the usefulness of these special functions.
3. Justify the use of gamma function, beta function special functions, Hypergeometric function and Hypergeometric series to: evaluate different types of integral calculus problems and solve differential equations.

CO-PO Mapping Matrix:

CO's/PO's	PO1	PO2	PO3
CO1	3	2	2
CO2	3	2	3
CO3	3	2	3
CO4	2	1	2

Scale (1: Low, 2: Medium, 3: High correlation.)

FYBS Semester-I

Course Code: MT-111

Course Title: Calculus

Program Outcomes (POs)

1. PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.
2. PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.
3. PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.
4. PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.
5. PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

6. CO1: Understand the notions of real numbers, supremum, infimum and completeness of real numbers.
7. CO2: Understand the notion of limit of a sequence.
8. CO3: Understand the notion of convergence of a series of real numbers.
9. CO4: Calculate the limit of a function at a point.

PO–CO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓		✓	
CO2	✓	✓		✓	
CO3	✓	✓		✓	
CO4	✓	✓	✓	✓	

F.Y.B.Sc. Mathematics Syllabus by Shahin Khan

Course Outcomes and PO–CO Mapping

Course Code: MT-111

Course Title: Calculus

Program Outcomes (POs)

10. PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.
11. PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.
12. PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.
13. PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.
14. PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

15. CO1: Understand the notions of real numbers, supremum, infimum and completeness of real numbers.
16. CO2: Understand the notion of limit of a sequence.
17. CO3: Understand the notion of convergence of a series of real numbers.
18. CO4: Calculate the limit of a function at a point.

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

Course Code: MT-112

Course Title: Practical Course on Matrix Algebra

Program Outcomes (POs)

19. PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.
20. PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.
21. PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.
22. PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.
23. PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

24. CO1: Understand operations on matrices.
25. CO2: Understand the concept of rank of a matrix and inverse of a matrix.
26. CO3: Understand the concept of eigenvalues and eigenvectors.
27. CO4: Understand the concept of orthogonal matrices, quadratic forms, diagonal forms and canonical forms.

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

Course Code: MT-114

Course Title: Mathematics for Competitive Examinations

Program Outcomes (POs)

28. PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.
29. PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.
30. PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.
31. PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.
32. PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

33. CO1: Understand and appreciate usage of mathematical concepts which are utmost important in all walks of life.
34. CO2: Solve the problems easily by using short-cut methods with time management which will be helpful for clearing competitive examinations for better job opportunities.
35. CO3: Analyze the problems logically and approach the problems in a different manner.

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓

Course Code: MT-121

Course Title: Theory of Equations

Program Outcomes (POs)

36. PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.
37. PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.
38. PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.
39. PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.
40. PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

41. CO1: Use of Principle of Mathematical Induction and understand divisibility of numbers with their properties.
42. CO2: Find out roots of any equation of degree less than or equal to five.
43. CO3: Know the relation between roots and coefficients of quadratic, cubic and biquadratic equations and their use for finding the roots of equations.
44. CO4: Use of Cardon's method and Descarte's method for solving equations.

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

Course Code: MT-122

Course Title: Practical Course on Coordinate Geometry

Program Outcomes (POs)

45. PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.
46. PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.
47. PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.
48. PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.
49. PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

50. CO1: Gain a thorough understanding of two-dimensional geometry, including principles of shapes, angles, and properties of various geometric figures.
51. CO2: Acquire comprehensive knowledge of three-dimensional geometry, focusing on the properties and applications of spheres, cones, and cylinders.
52. CO3: Demonstrate the ability to interpret and analyze three-dimensional shapes in real-world scenarios.
53. CO4: Apply acquired geometric knowledge to solve practical problems and make informed decisions in relevant fields.

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

FYBSC Semester-II

Course Code: MT-121

Course Title: Theory of Equations

Program Outcomes (POs)

54. PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.
55. PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.
56. PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.
57. PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.
58. PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

59. CO1: Use of Principle of Mathematical Induction and understanding divisibility of numbers with their properties.
60. CO2: Find out roots of any equation of degree ≤ 5.
61. CO3: Know the relation between roots and coefficients of quadratic, cubic and biquadratic equations and their use for finding roots of equations.
62. CO4: Use of Cardon's method and Descarte's method for solving equations.

PO–CO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓		✓	
CO2	✓	✓	✓		
CO3	✓	✓		✓	
CO4	✓	✓		✓	

S.Y.B.Sc Mathematics

Semester-I

MT-211 – Calculus of Single Variable

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Demonstrate a clear understanding of limits, continuity, derivatives, and integrals as foundational concepts in calculus.

CO2: Apply differentiation techniques and related theorems to analyze functions and solve problems involving continuity and successive derivatives.

CO3: Understand and use Mean Value Theorems, Taylor's and Maclaurin's theorems in both theoretical and applied contexts.

CO4: Interpret and use first and second derivatives to study the behavior of functions, including graphing and rate-of-change analysis.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-212 – Vedic Mathematics

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Perform rapid and accurate arithmetic operations using Vedic methods.

CO2: Demonstrate proficiency in dividing and factorizing algebraic expressions using Vedic techniques.

CO3: Solve simple and complex equations using Vedic methods.

CO4: Develop analytical thinking and appreciation of Indian mathematical traditions.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-213 – Practical Course on Laplace Transform

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand basic concepts of Laplace and inverse Laplace transforms.

CO2: Compute Laplace transforms of standard and periodic functions.

CO3: Apply properties of Laplace transforms to solve problems.

CO4: Solve differential equations using Laplace transform techniques.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-214 – Linear Programming Problems

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Solve linear programming problems using graphical method.

CO2: Solve linear programming problems using simplex method.

CO3: Solve assignment problems using Hungarian method.

CO4: Solve game theory problems using appropriate methods.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-215 – Introduction to Python

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Use Python for mathematical and symbolic computations.

CO2: Create plots and visual representations using Python.

CO3: Explore mathematical theories using Python.

CO4: Solve calculus and matrix problems using Python.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-216 – Practical Course on Python

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Use Python for computations and automation.

CO2: Create graphical representations of data.

CO3: Explore mathematical concepts using Python.

CO4: Solve calculus and matrix problems practically.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-217 – Mathematics for Competitive Examinations II

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Interpret data from tables, graphs, and charts.

CO2: Identify patterns in number and letter series.

CO3: Solve coding-decoding and relationship problems.

CO4: Solve logical reasoning and puzzle-based problems.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-218 – Discrete Mathematics

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Describe structures of posets and lattices.

CO2: Apply diagrammatic representations of lattices.

CO3: Distinguish types of lattices.

CO4: Understand lattice homomorphisms and Boolean lattices.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-219 – Practical Course on SciLab

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Perform mathematical computations using SciLab.

CO2: Visualize mathematical functions using SciLab.

CO3: Analyze mathematical problems through simulation.

CO4: Implement mathematical verification using SciLab.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

Semester-II

MT-221 – Group Theory

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Identify and verify group structures.

CO2: Analyze subgroups and cyclic groups.

CO3: Apply homomorphisms and isomorphisms.

CO4: Work with permutations and alternating groups.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-222 – Practical Course on Ordinary Differential Equations

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand basic concepts of differential equations.

CO2: Apply methods to solve differential equations.

CO3: Understand applications of differential equations.

CO4: Solve homogeneous linear differential equations.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-223 – Graph Theory

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand basic graph concepts.

CO2: Apply graph theoretic techniques.

CO3: Analyze properties of graphs.

CO4: Solve problems using graph theory.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-224 – Practical Course on Graph Theory

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Implement graph algorithms practically.

CO2: Analyze graphs computationally.

CO3: Solve graph problems using software.

CO4: Interpret graph-based solutions.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-225 – Business Mathematics

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Apply mathematics in business contexts.

CO2: Solve financial mathematics problems.

CO3: Use mathematical models in business.

CO4: Analyze business data mathematically.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

MT-226 – Introduction to SageMath

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Use SageMath for symbolic computation.

CO2: Perform algebraic computations.

CO3: Apply SageMath in calculus.

CO4: Solve mathematical problems using SageMath.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO	✓	✓	✓	✓	✓

MT-227 – Practical Course on SageMath

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Implement computations using SageMath.

CO2: Visualize mathematical results.

CO3: Solve algebra and calculus problems.

CO4: Apply SageMath to practical problems.

CO–PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓

M.Sc. Mathematics – Shahin Khan

Course Code: MT-511

Course Title: Topics in Functional Analysis

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand Banach spaces and Hilbert spaces.

CO2: Understand Bessel's inequalities, Riesz theorem, Banach extension theorem, closed graph theorem and uniform boundedness theorem.

CO3: Learn the concept of adjoint, normal and unitary operators, spectral theorem.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1

Course Code: MT-512

Course Title: Statistical Techniques

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand basic statistical concepts and measures.

CO2: Apply correlation and regression techniques.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1

Course Code: MT-513

Course Title: Numerical Analysis

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Acquire techniques of numerical methods.

CO2: Solve systems of equations using numerical techniques.

CO3: Find numerical solutions of differential equations.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1

Course Code: MT-514

Course Title: Topics in Field Theory

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand theory of field extensions.

CO2: Apply Eisenstein's criterion.

CO3: Understand Galois theory and extensions.

CO4: Apply fundamental theorem of Galois theory.

CO5: Perform geometric constructions.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1
CO4	1	1	1	1	1
CO5	1	1	1	1	1

Course Code: MT-515(A)

Course Title: Lattice Theory

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand lattices as algebraic structures.

CO2: Explain homomorphisms and Boolean algebra.

CO3: Understand neutral elements and structure theorem.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1

Semester -II

Course Code: MT-521

Course Title: Linear Integral Equations

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Relate differential and integral equations.

CO2: Solve integral equations using different kernels.

CO3: Apply Laplace and Fourier transforms.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1

Course Code: MT-522

Course Title: Operations Research

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Solve sequencing and dynamic programming problems.

CO2: Understand queueing systems.

CO3: Apply simulation and optimization techniques.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1

Course Code: MT-523

Course Title: Commutative Algebra

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand exact sequences and modules.

CO2: Explain Artinian modules and rings.

CO3: Learn valuation rings.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1

Course Code: MT-524(A)

Course Title: Advanced Abstract Algebra

Program Outcomes (POs)

PO1: In-depth Mathematical Knowledge - Provides comprehensive understanding of geometry, algebra, calculus, differential equations and several other branches of pure and applied mathematics, extending to computer science and allied subjects.

PO2: Problem-Solving and Modeling Skills - Students gain skills and knowledge for modeling and solving real-life problems using mathematical techniques.

PO3: Enhanced Employability - Graduates become employable in various government and private sector organizations.

PO4: Quantitative Skills Development - Students develop enhanced quantitative skills for pursuing higher mathematics and research.

PO5: Digital Competency - Students learn to use appropriate digital programs and software to solve various mathematical problems.

Course Outcomes (COs)

CO1: Understand different types of ideals.

CO2: Learn Jacobson and prime radicals.

CO3: Study direct sum of rings and Noetherian rings.

CO–PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1

Department of Botany

Dr. Tanveer Akhtar Khan
S.Y. B.Sc Botany
B. Sc. (Honors/Research) Second Year Semester - III, Level- 5.0 DSC-5, Course Code: BO-211 Course Title: **Angiosperm Taxonomy**

Programme Outcomes (POs):

1. PO1: Understanding of basic principles in plant taxonomy.
2. PO2: Ability to identify angiosperm families and use taxonomic tools.
3. PO3: Application of classification systems and botanical knowledge.
4. PO4: Awareness of biodiversity documentation and conservation tools like herbaria and botanical gardens.
5. PO5: Preparation for advanced study and research in plant sciences.

Course Outcomes (COs):

1. **CO1:** Define taxonomy, its scope, and its importance.
2. **CO2:** Describe classification systems with historical perspective.
3. **CO3:** Identify key plant families based on morphological features.
4. **CO4:** Explain the role and functions of botanical gardens.
5. **CO5:** Demonstrate knowledge of herbarium preparation and its scientific value.

CO-PO Mapping Matrix:

Course Outcomes \ Programme Outcomes	PO1	PO2	PO3	PO4	PO5
CO1: Definition, Scope, Importance of Taxonomy	3	2	2	1	1
CO2: Classification Systems & Concepts	2	3	3	1	2
CO3: Study and Identification of Plant Families	1	3	3	2	2

Course Outcomes \ Programme Outcomes	PO1	PO2	PO3	PO4	PO5
CO4: Botanical Gardens & their Roles	1	2	2	3	2
CO5: Herbarium Techniques and Digital Herbarium	1	2	2	3	3

Legend:

3 = Strongly correlated
2 = Moderately correlated
1 = Slightly correlated
0 = Not correlated

B. Sc. (Honors/Research) Second Year Semester - III, Level- 5.0 MIN- 1, Course Code: BO-214 Course Title: Ethnobotany

---

Programme Outcomes (POs):

1. **PO1:** Understand plant-human cultural relationships and traditional knowledge systems.
2. **PO2:** Apply ethnobotanical methods to document tribal and folk plant uses.
3. **PO3:** Analyze the ethnobotanical value of plants for medicine, food, and utility.
4. **PO4:** Promote conservation through traditional plant knowledge.
5. **PO5:** Develop skills for interdisciplinary ethnobotanical research and sustainable practices.

Course Outcomes (COs):

1. **CO1:** Understand the scope, history, and subfields of ethnobotany.
2. **CO2:** Demonstrate knowledge of fieldwork methods and tribal diversity in North Maharashtra.
3. **CO3:** Recognize medicinal plants used against human and veterinary ailments.
4. **CO4:** Identify food, beverage, and utilitarian plants in tribal cultures.
5. **CO5:** Explain tribal cosmetic, ornamental, and decorative plant uses.

CO-PO Mapping Matrix

Course Outcomes \ Programme Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1: Introductory Concepts & Scope	3	2	2	1	2
CO2: Fieldwork, Tribes, Herbaria	2	3	2	2	3
CO3: Ethnomedicine – Human and Veterinary Use	2	3	3	2	2
CO4: Plants for Food, Beverages, Fodder, etc.	2	2	3	2	2
CO5: Cosmetics & Decorative Plant Uses	1	2	3	2	2

Legend:
3 = Strongly correlated
2 = Moderately correlated
1 = Slightly correlated
0 = Not correlated

B. Sc. (Honors/Research) Second Year Semester - IV, Level- 5.0 DSC-8, Course Code: BO-221 Course Title: Gymnosperm and Paleobotany

---

Programme Outcomes (POs)

1. **PO1**: Understand gymnosperm and fossil plant evolution
2. **PO2:** Identify structural, morphological, and reproductive features of gymnosperms
3. **PO3**: Interpret paleobotanical data and fossil plant groups
4. **PO4**: Understand ecological and economic importance of gymnosperms and fossils
5. **PO5**: Develop scientific skills in fossil study and plant systematics

Course Outcomes (COs)

1. **CO1:** Describe general characteristics, classification, and importance of Gymnosperms
2. **CO2:** Understand structure and reproduction in *Cycas* and explain its life cycle
3. **CO3:** Understand structure and reproduction in *Pinus* and explain its life cycle
4. **CO4:** Gain basic knowledge of Paleobotany, fossils, and geological time scale
5. **CO5:** Identify and describe important fossil plant groups and their features

CO–PO Mapping Matrix

Course Outcomes \ Programme Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1 – Introduction, Classification of Gymnosperms	3	3	1	2	2
CO2 – Life Cycle and Structures of *Cycas*	2	3	1	2	3
CO3 – Life Cycle and Structures of *Pinus*	2	3	1	2	3
CO4 – Basics of Paleobotany and Fossilization	3	2	3	2	2
CO5 – Study of Fossil Groups and Their Morphology	2	2	3	2	3

Legend:

- 3 = Strongly correlated
- 2 = Moderately correlated
- 1 = Slightly correlated
- 0 = Not correlated

B. Sc. (Honors/Research) Second Year Semester-IV, Level- 5.0 CEP, Course Code: BO-228 Course Title: Community Engagement Services

---

Programme Outcomes (POs)

Code	Description
PO1:	Demonstrate civic responsibility and community participation.
PO2:	Apply academic knowledge to real-life social and developmental contexts.
PO3:	Foster leadership, empathy, communication, and collaborative skills.
PO4:	Develop understanding of rural and urban community dynamics.
PO5:	Promote values of sustainability, equity, and inclusive development.

Course Outcomes (COs)

Code Description

CO1: Understand the goals and significance of community engagement in higher education.

CO2: Develop field-based skills in interacting with stakeholders and identifying community needs.

CO3: Demonstrate awareness of key government schemes, civic bodies, and developmental programmes.

CO4: Enhance leadership, team-building, and communication through real-world problem solving.

CO5: Engage in activities that promote environmental sustainability, social justice, and ethical action.

CO–PO Mapping Matrix

Course Outcomes \ Programme Outcomes	PO1	PO2	PO3	PO4	PO5
CO1 – Understanding of engagement framework	3	2	2	2	2
CO2 – Fieldwork skills and community interaction	3	3	2	3	2
CO3 – Knowledge of schemes and civic structures	2	3	2	3	3
CO4 – Leadership and collaborative engagement	2	3	3	2	2
CO5 – Ethical, environmental and social action	3	2	3	2	3

T.Y.B.Sc SEMESTER – V

BOT. 502: MORPHOLOGY AND SYSTEMATICS OF ANGIOSPERMS

Programme Outcomes (POs)

PO No. Programme Outcome

PO1: Develop foundational and advanced knowledge of plant sciences.

PO2: Apply morphological, anatomical, and systematic knowledge in identification and classification of plants.

PO3: Demonstrate skills in plant taxonomy and understand plant diversity and evolution.

PO4: Cultivate analytical and observational skills through practical taxonomy.

PO5: Understand the role of plants in the ecosystem and apply this understanding in conservation biology.

PO6: Develop scientific aptitude and critical thinking for higher education and research.

Course Outcomes (COs)

CO No. Course Outcome

CO1: Understand vegetative and floral morphology of angiosperms.

CO2: Identify and classify inflorescence and flower types using morphological characteristics.

CO3: Explain the origin and evolutionary position of angiosperms in the plant kingdom.

CO4: Compare classical systems of classification and evaluate modern taxonomic approaches.

CO5: Analyze and describe selected families with emphasis on diagnostic features, floral formula, and economic importance.

CO6: Interpret the taxonomic significance of anatomical and embryological features.

CO-PO Mapping Matrix:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	2	1	1
CO2	3	3	3	3	1	1
CO3	2	2	3	2	2	2
CO4	3	3	3	3	1	2
CO5	3	3	3	3	2	2
CO6	2	3	3	3	2	3

Legend:
3 = Strongly correlated
2 = Moderately correlated
1 = Slightly correlated
0 = Not correlated

T.Y.B.Sc SEMESTER – VI Paper - II
BOT. 602: GYMNOSPERMS AND PALEOBOTANY

Programme Outcomes (POs)

PO No. Programme Outcome

PO1: Understand core concepts in botany and plant biology.
PO2: Apply knowledge of plant diversity, anatomy, morphology, and reproduction.
PO3: Compare evolutionary trends and phylogenetic relationships in plants.
PO4: Demonstrate practical skills in plant identification and laboratory investigation.
PO5: Appreciate the significance of fossil records and geological time in plant evolution.
PO6: Develop scientific temperament, analytical ability, and aptitude for research.

Course Outcomes (COs):

CO No. Course Outcome

CO1: Understand the unique features of Gymnosperms and distinguish them from Angiosperms
CO2: Explain the classification of Gymnosperms up to orders as per K. R. Sporne.
CO3: Describe the detailed life cycle and reproductive biology of *Pinus*.
CO4: Study anatomical peculiarities and life cycle of *Gnetum*, including angiospermic features
CO5: Define fossils and fossilization, and explain the importance of Paleobotany.
CO6: Identify and describe important fossil plant genera representing major fossil groups.

CO-PO Mapping Matrix:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	2	1	1
CO2	3	3	3	2	1	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	2	2
CO5	2	2	3	1	3	3
CO6	2	2	3	2	3	3

Legend:
3 = Strongly correlated
2 = Moderately correlated
1 = Slightly correlated
0 = Not correlated

F.Y. B.Sc. Semester I Paper II

BOT 102: Morphology of Angiosperms

(Year 19-20 to 2023-24)

✅ Step 1: Define Program Outcomes (POs)

Below is a typical list of **Program Outcomes** in a biology or botany undergraduate program. These can be adapted based on your university's official list:

PO No.	Program Outcome
PO1	**Knowledge**: Apply knowledge of biology fundamentals to understand plant structure and function.
PO2	**Problem Analysis**: Identify and analyze problems in plant science through observation and experimentation.
PO3	**Investigation**: Use appropriate tools and methods to investigate biological systems.
PO4	**Modern Tool Usage**: Use ICT and lab equipment for biological experiments.
PO5	**Environment and Sustainability**: Understand plant adaptations in context of ecosystems.
PO6	**Ethics**: Follow ethical principles in handling biological materials.
PO7	**Communication**: Communicate biological information clearly using diagrams and terminology.
PO8	**Life-long Learning**: Recognize the importance of botanical knowledge for ongoing learning and research.

✅ Step 2: Map Course Outcomes (COs) to POs

Course Outcome (CO)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1: Understand ground plan of angiospermic plant	3	2	2	1	2	–	2	2
CO2: Awareness of vegetative & reproductive traits	3	2	2	1	3	–	2	2
CO3: Understand modifications & functions of plant parts	3	2	2	2	3	–	2	3

✅ Step 3: CO-PO Mapping Analysis Summary

- **CO1** is strongly mapped to PO1 (knowledge), moderately to PO2 (problem-solving), and lightly to tool use and communication.
- **CO2** emphasizes both knowledge and environmental understanding.
- **CO3** has the **widest coverage**, addressing knowledge, tool use, sustainability, and life-long learning — ideal for encouraging higher-level thinking.

CO-PO Mapping in table form

Course Outcome (CO)	PO1: Knowledge	PO2: Problem Analysis	PO3: Investigation	PO4: Modern Tool Usage	PO5: Environment & Sustainability	PO6 : Ethics	PO7: Communication	PO8: Life-long Learning
CO1: Understand ground plan of angiosperm ic plant	3	2	2	1	2	–	2	2
CO2: Awareness of vegetative & reproductive traits	3	2	2	1	3	–	2	2
CO3: Understand modifications & functions of plant parts	3	2	2	2	3	–	2	3

F.Y. B.Sc. Botany Paper II
(BOT-202): Taxonomy of Angiosperms - Semester II
(June 2019 -2024)

Course Outcomes (COs):

CO Code	Course Outcome Description
CO5	Understanding of angiospermic plants, causes of phenomenal succession, and alternation of generations.
CO6	Understand the systems of classification of angiosperms, nomenclature, and interdisciplinary approaches.
CO7	Provide lab-based training in writing short species descriptions and illustrations.
CO8	Recognize members of the major angiosperm families by identifying their diagnostic features, economic and medicinal importance.
CO9	Understand botanical gardens and herbarium techniques.

Program Outcomes (POs):

PO Code	Program Outcome Description
PO1	Knowledge of fundamental concepts in Botany and life sciences.
PO2	Understanding of biodiversity and taxonomy.
PO3	Practical skills in plant identification, taxonomy, and lab work.
PO4	Appreciation of the role of plants in ecosystems and human life (economic/medicinal importance).
PO5	Ability to engage in scientific reasoning and interdisciplinary approaches.
PO6	Skills in scientific documentation, communication, and herbarium techniques.
PO7	Preparation for further education or employment in plant sciences, conservation, or agriculture.

CO-PO Mapping Matrix:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO5	3	2	2	2	3	1	2
CO6	3	3	2	2	3	2	2
CO7	2	2	3	1	2	3	2
CO8	2	3	3	3	2	1	2
CO9	2	2	3	2	2	3	2

Explanations:

- **CO5 (Understanding of angiospermic plants, causes of phenomenal succession, and alternation of generations)**:
  - **PO1 (Knowledge of fundamental concepts)**: Strong correlation, as understanding angiosperms' life cycles (including alternation of generations) is foundational to plant science.
  - **PO5 (Interdisciplinary approaches)**: High correlation, as alternation of generations ties into ecological and evolutionary concepts.
- **CO6 (Systems of classification of angiosperms, nomenclature, and interdisciplinary approaches)**:
  - **PO2 (Understanding biodiversity and taxonomy)**: Strong correlation, as taxonomy and classification are directly related to biodiversity studies.
  - **PO5 (Interdisciplinary approaches)**: High correlation, classification integrates aspects of genetics, evolution, and ecology.
- **CO7 (Lab-based training in species descriptions and illustrations)**:
  - **PO3 (Practical skills in plant identification)**: High correlation, as the training involves hands-on plant identification and documentation.
  - **PO6 (Scientific documentation and communication)**: Strong correlation, since creating accurate descriptions and illustrations requires documentation skills.
- **CO8 (Recognizing members of angiosperm families and their diagnostic features)**:
  - **PO2 (Understanding biodiversity and taxonomy)**: Strong correlation, as it directly involves identifying species and understanding family-level diversity.
  - **PO4 (Appreciation of plants' role in ecosystems)**: Moderate, as the course explores plants' economic and medicinal roles.
- **CO9 (Understanding botanical gardens and herbarium techniques)**:
  - **PO6 (Skills in scientific documentation)**: Strong correlation, as herbarium techniques and botanical gardens emphasize preservation and cataloging.
  - **PO7 (Preparation for future careers)**: Moderate, as knowledge of botanical gardens and herbaria is essential for plant science careers.

Mapping Summary:

- **High correlation** (3) with foundational POs like **PO1**, **PO2**, and **PO3** for understanding taxonomy, plant identification, and classification.
- **Medium correlation** (2) with POs like **PO4** (economic and medicinal importance) and **PO5** (interdisciplinary reasoning).
- **Low correlation** (1) with **PO6** (scientific documentation) for some COs, but this still plays an important role in te CO-PO Mapping and Analysis for Bot-202: Taxonomy of Angiosperms
- Program Outcomes (POs)

- 1. Study diversity of angiosperms
- 2. Comparative account among angiosperm families
- 3. Economic importance of angiospermic plants
- 4. Distinguishing features, medicinal and economic importance
- 5. Botanical garden and herbarium techniques
-
- Course Outcomes (COs)
- 1. Understanding angiospermic plants (CO5)
- 2. Systems of classification and nomenclature (CO6)
- 3. Lab-based training in species descriptions and illustration (CO7)
- 4. Recognition of major angiosperm families (CO8)
- 5. Understanding botanical gardens and herbarium techniques (CO9)
-
- CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5
CO5	3	2	1	2	1
CO6	2	3	1	2	1
CO7	1	1	1	2	2
CO8	3	3	2	3	1
CO9	1	1	1	1	3

- Analysis
- - Strong Alignment: CO8 (Recognition of major angiosperm families) strongly aligns with PO1 (Diversity), PO2 (Comparative account), and PO4 (Distinguishing features).
- - Moderate Alignment: CO5 (Understanding angiospermic plants) and CO6 (Systems of classification) moderately align with multiple POs.
- - Weak Alignment: CO7 (Lab-based training) and CO9 (Botanical gardens and herbarium techniques) have weaker alignments, indicating potential areas for improvement.
-
- This analysis helps identify areas where course outcomes align with program outcomes, enabling targeted

- improvements. chnical skills development.

DSC- 1 Major (Core) Course Botany
BO-111 Plant Diversity SEM I
(Year 2024 – 2025)

Course Objectives (CO) vs. Program Outcomes (PO)

Course Objectives (CO)	Program Outcomes (PO)
1. To understand the characteristic features of Bacteria, Algae, Fungi, Lichen, Bryophytes, Pteridophytes, and Phanerogams.	**PO1**: Understanding of basic principles in biological science. **PO3**: Ability to identify and classify organisms. **PO4**: Understanding of diversity in biological kingdoms.
2. To help the student understand the diversity of plants.	**PO2**: Knowledge of plant diversity and classification. **PO6**: Analytical skills to classify plant species based on morphology.
3. Learn about the structure, pigmentation, food reserves, and methods of reproduction of Algae.	**PO5**: Understanding cellular biology and biochemistry. **PO7**: Application of biological concepts in laboratory/field settings.
4. Learn about the structure, pigmentation, food reserves, and methods of reproduction of Algae, Fungi, Lichen, Bryophytes, Pteridophytes, and Phanerogams.	**PO5**: Knowledge of plant structures, food reserves, and reproduction. **PO8**: Field identification of plant types and their reproductive strategies.
5. To understand the diversity of Gymnosperms and Angiosperms.	**PO4**: Knowledge of plant physiology, reproduction, and classification. **PO6**: Understanding of the evolutionary significance of Gymnosperms and Angiosperms.

Course Outcomes (CO) vs. Program Outcomes (PO)

Course Outcomes (CO)	Program Outcomes (PO)
1. Microscopic observation and identification of algae, fungi, bryophytes, lichens, pteridophytes, and gymnosperm.	**PO7**: Practical lab skills in microscopy and identification of plant and fungal species. **PO3**: Observation and analysis of specimens.
2. Observation of crop plants infected by pathogens included in the syllabus and study of symptoms, causative agents, and etiology.	**PO6**: Ability to diagnose plant diseases and understand plant pathology. **PO5**: Knowledge of plant pathogens and their effects on crop plants.
3. Know the systematic, morphology, and structure of Gymnosperms.	**PO4**: Knowledge of systematic classification and plant morphology. **PO1**: Understanding of gymnosperm characteristics.
4. Understand the habit of the angiosperm plant body.	**PO1**: Understanding of plant physiology and structure. **PO4**: Ability to relate plant morphology to ecological functions.
5. Know the vegetative characteristics of the plant.	**PO4**: Understanding the vegetative structures and their functions in plants. **PO6**: Comparative analysis of vegetative traits in different plant groups.

Analysis of CO-PO Mapping:

1. **CO1** maps well to **PO1**, **PO3**, and **PO4**, as it focuses on classification, diversity, and identification of various organisms at a microscopic level, which are fundamental aspects of biology.
2. **CO2** aligns with **PO2** and **PO6**, focusing on understanding the plant kingdom's diversity and applying this knowledge in real-world settings, such as identifying pathogens in crop plants.
3. **CO3 and CO4** map directly to **PO5**, **PO7**, and **PO6**, as they delve into the internal biological structures of different groups like algae, fungi, and vascular plants, as well as

their methods of reproduction, which are essential for biological classification and ecology.

4. **CO5** aligns with **PO6**, **PO1**, and **PO4**. The focus on Gymnosperms and Angiosperms in terms of their systematic structure and diversity connects well with knowledge in plant classification, morphology, and ecological adaptation.

---

1. **Tabular CO-PO Matrix** – showing the strength of relationships between Course Outcomes (COs) and Program Outcomes (POs).
2. **Analysis/Interpretation** – discussing how well course outcomes contribute to achieving program-level outcomes.
3. **Legend for Mapping Levels**:
   - **3** – Strongly related
   - **2** – Moderately related
   - **1** – Slightly related
   - **0** – Not related

◆ CO-PO Mapping Table

CO\PO	PO1 (Basic biology)	PO2 (Plant diversity)	PO3 (Identification)	PO4 (Morphology & Taxonomy)	PO5 (Reproduction & Structures)	PO6 (Field application)	PO7 (Lab skills)	PO8 (Ecological relevance)
CO1	3	2	3	2	2	1	3	1
CO2	2	1	2	1	3	3	2	2
CO3	3	2	3	3	2	2	2	1

CO4	3	2	2	3	3	2	2	2
CO5	2	3	2	3	2	2	1	2

◆ Analysis and Interpretation

- **Strong Alignment (Score 3)**:
  - **CO1 with PO1, PO3, PO7**: Shows strong integration of basic biology knowledge and practical identification skills.
  - **CO2 with PO5, PO6**: Emphasizes understanding of plant disease symptoms, agents, and their real-world implications.
  - **CO4 with PO4, PO5**: Reinforces understanding of plant structures and reproduction across major plant groups.
  - **CO3 with PO1, PO3, PO4**: Strong linkage to systematic and morphological understanding.
- **Moderate Alignment (Score 2)**:
  - Seen across most COs and POs, especially in areas like diversity (PO2), morphology (PO4), and reproduction (PO5), indicating balanced coverage of both theoretical and practical components.
- **Weak or No Alignment (Score 1/0)**:
  - Minor alignment with **PO8** (Ecological relevance), suggesting the course may need to integrate more ecological or environmental context.
  - CO2 shows less focus on taxonomy and biodiversity (PO2 and PO4), possibly due to its applied pathology focus.

PAPER - V
BOT. 505: BIOFERTILIZERS
SEMESTER – V
(Year 2024-25)

AIMS AND OBJECTIVES:

1. To introduce application of Biofertilizer technology in Agriculture
2. To familiarize students with microbes used as biofertilizers
3. To demonstrate the low cost media preparation and cultural practices in biofertilizers
4. To aware the students about benefits of applications of biofertilizers
5. To create self employment opportunities among the students

SY BSC BOTANY

Course Code: BO-212	**Course Category: Core Course (DSC-6)**
Course Title: Plant Physiology	**Type: Theory**
Total Contact Hours: (2/week)	**Course Credits: 02**
College Assessment (CA) Marks: 20	**University Assessment (UA): 30**

Program Outcomes (POs)

After completing the B.Sc. program, students will be able to:

PO1 – Knowledge and Understanding:
Acquire fundamental and advanced knowledge in various domains of botany including plant physiology, anatomy, taxonomy, ecology, and biotechnology.

PO2 – Problem Analysis:
Identify, analyze, and interpret biological problems, using logical reasoning and evidence-based conclusions.

PO3 – Conduct of Investigations:
Plan and perform experiments, collect and interpret data, and derive valid conclusions in plant sciences.

PO4 – Modern Tool Usage:
Apply modern laboratory tools, techniques, and IT resources for data analysis and presentation.

PO5 – Environment and Sustainability:
Understand plant–environment relationships and apply knowledge for sustainable ecosystem management.

PO6 – Ethics:
Recognize ethical principles in biological research and professional practice.

PO7 – Communication:
Communicate effectively in both oral and written forms about biological concepts and findings.

PO8 – Life-long Learning:
Recognize the need for independent and lifelong learning in the broadest context of science and technology.

Course Outcomes (COs) – BO-212 Plant Physiology

CO1: Explain processes like diffusion, osmosis, and imbibition in relation to plant water relations.
CO2: Describe the mechanism of water absorption and ascent of sap.
CO3: Interpret the types, mechanisms, and factors influencing transpiration.
CO4: Explain photosynthetic processes, pigment systems, and differences between C3, C4, and CAM pathways.
CO5: Illustrate aerobic and anaerobic respiration processes and factors affecting them.

CO–PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	2	1	1	2
CO2	3	2	2	1	2	1	1	2
CO3	3	3	2	2	3	2	2	3

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO4	3	3	3	2	3	2	2	3
CO5	3	3	3	2	2	2	2	3

Legend for Correlation Levels

- **3 – High correlation**: CO strongly addresses the PO.
- **2 – Moderate correlation**: CO moderately addresses the PO.
- **1 – Low correlation**: CO weakly addresses the PO.
- **Blank**: No significant correlation.

SY BSC BOTANY

Course Code: BO-212
Course Category: Core Course (DSC-6)
Course Title: Plant Physiology
Type: Theory
Total Contact Hours: (2/week)
Course Credits: 02
College Assessment (CA) Marks: 20
University Assessment (UA): 30

Program Outcomes (POs)

After completing the B.Sc. program, students will be able to:

PO1 – Knowledge and Understanding:
Acquire fundamental and advanced knowledge in various domains of botany including plant physiology, anatomy, taxonomy, ecology, and biotechnology.

PO2 – Problem Analysis:
Identify, analyze, and interpret biological problems, using logical reasoning and evidence-based conclusions.

PO3 – Conduct of Investigations:
Plan and perform experiments, collect and interpret data, and derive valid conclusions in plant sciences.

PO4 – Modern Tool Usage:
Apply modern laboratory tools, techniques, and IT resources for data analysis and presentation.

PO5 – Environment and Sustainability:
Understand plant–environment relationships and apply knowledge for sustainable ecosystem management.

PO6 – Ethics:
Recognize ethical principles in biological research and professional practice.

PO7 – Communication:
Communicate effectively in both oral and written forms about biological concepts and findings.

PO8 – Life-long Learning:
Recognize the need for independent and lifelong learning in the broadest context of science and technology.

Course Outcomes (COs) – BO-212 Plant Physiology

CO1: Explain processes like diffusion, osmosis, and imbibition in relation to plant water relations.
CO2: Describe the mechanism of water absorption and ascent of sap.
CO3: Interpret the types, mechanisms, and factors influencing transpiration.
CO4: Explain photosynthetic processes, pigment systems, and differences between C3, C4, and CAM pathways.
CO5: Illustrate aerobic and anaerobic respiration processes and factors affecting them.

CO–PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	2	1	1	2
CO2	3	2	2	1	2	1	1	2
CO3	3	3	2	2	3	2	2	3

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO4	3	3	3	2	3	2	2	3
CO5	3	3	3	2	2	2	2	3

Legend for Correlation Levels

- **3 – High correlation**: CO strongly addresses the PO.
- **2 – Moderate correlation**: CO moderately addresses the PO.
- **1 – Low correlation**: CO weakly addresses the PO.
- **Blank**: No significant correlation.

SY. B.A .OE

Course Code: BO-217 **Course Category: OE-3**
Course Title: Herbal Health Remedies **Type: Theory**
Total Contact Hours: (2/week) **Course Credits: 02**
College Assessment (CA) Marks: 20 **University Assessment (UA): 30**

Program Outcomes (POs) – For B.Sc. Botany / Life Sciences

PO1 – Knowledge and Understanding:
Gain fundamental and applied knowledge in botany, including plant anatomy, physiology, pharmacognosy, and ethnobotany.

PO2 – Problem Analysis:
Analyze health-related problems and propose plant-based remedial measures supported by scientific reasoning.

PO3 – Conduct of Investigations:
Design, perform, and interpret small-scale herbal remedy preparations and evaluate their effectiveness.

PO4 – Modern Tool Usage:
Use ICT tools, herbarium preparation techniques, and phytochemical analysis methods for documentation and research.

PO5 – Environment and Sustainability:
Apply knowledge of sustainable harvesting and biodiversity conservation in the use of medicinal plants.

PO6 – Ethics:
Understand ethical aspects of traditional knowledge, including intellectual property rights and fair use.

PO7 – Communication:
Effectively communicate herbal knowledge to diverse audiences using appropriate terminology.

PO8 – Life-long Learning:
Develop skills for self-directed learning in herbal science, traditional medicine, and allied health practices.

Course Outcomes (COs) – BO-217 Herbal Health Remedies

CO1: Identify and describe various medicinal plants and their traditional uses.
CO2: Explain the basic science behind herbal remedies and their potential therapeutic effects.
CO3: Critically evaluate scientific evidence supporting herbal claims and recognize their limitations.
CO4: Demonstrate safe preparation and usage methods for common herbal remedies.
CO5: Apply responsible self-care practices integrating traditional and evidence-based approaches.
CO6: Exhibit respect for cultural diversity and sustainable harvesting practices in medicinal plant usage.

CO–PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	2	3	2	2	2
CO2	3	3	2	2	2	2	2	3

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO3	3	3	2	2	2	3	2	3
CO4	3	2	3	3	2	2	3	3
CO5	2	3	2	2	3	3	3	3
CO6	2	2	2	2	3	3	3	3

Legend for Correlation Levels

- **3 – High correlation**: CO strongly addresses the PO.
- **2 – Moderate correlation**: CO moderately addresses the PO.
- **1 – Low correlation**: CO weakly addresses the PO.
- **Blank**: No significant correlation.

Department of Zoology

F.Y.B.S Program Outcomes (PO)

PO-1	Thorough knowledge and understanding of the theories, models, concepts and principles of zoology and related zoological applications.
PO-2	Recognize the relationship between parts of different species, our physical, biological and cultural environment.
PO-3	Gain an understanding of the evolutionary history and key characteristics of animal groups.
PO-4	Understanding and critical analysis of population processes, dynamics and interactions, and related models.
PO-5	Comprehend the ecosystem, biogeography, diversity, and correlation with climatic, paleo-historic and evolutionary factors.

Program Specific Outcomes (PSO)

PSO No.	On completion of B.Sc. Zoology Degree Program, the graduates will be able to:	Mapping
PSO-1	To know the basic principles of zoology. Recognition, the relationship between structure and function, and biological organization of animals.	PO-2
PSO-2	Analyze animal theory, classification, form and function, and evolution, and compare the structures of prokaryotes and eukaryotes.	PO-3
PSO-3	Understand the diversity of animals with taxonomy and the classification of animals with diagnostic features.	PO-2
PSO-4	Apply knowledge and understanding of conservation and restoration Biodiversity, ecological integrity, and health.	PO-5
PSO-5	To understand practical biological sciences such as sericulture, Fish farming and beekeeping	PO-1
PSO-6	Collect, record and analyze data using relevant environmental, genetic, Physiological methods in the field and in the laboratory.	PO-3

PSO-7	Effectively use information technology systems to analyze and interpret Review of information and evidence.	PO-3
PSO-8	Develop writing skills required in this program; publish research papers, oral presentations and conference posters.	PO-1
PSO-9	Describe the molecular and cellular basis of animal physiological functions.	PO-3
PSO-10	Provide innovative skills which will enable the knowledge and skills required for employment.	PO-2
PSO-11	Perform practical skills in the areas of basic and applied zoology	PO-1

Semester I

Course Title: DSC-01 ZO-111 Fundamentals of Medical Laboratory Techniques

Course Objectives

- Develop a strong understanding of laboratory safety protocols, including signage, personal hygiene, and first aid procedures, to ensure a safe working environment.
- Gain proficiency in using essential medical laboratory instruments like microscopes, centrifuges, balances, autoclaves, and spectrophotometers.
- Learn and perform essential blood tests such as blood group typing, hemoglobin estimation, erythrocyte sedimentation rate, packed cell volume, smear preparation, and basic cell counts (RBC, WBC, differential).
- Develop skills in performing a basic urinalysis, including physical examination (color, clarity, odor) and chemical analysis to identify normal and abnormal constituents.

Course Outcomes

- Apply proper safety protocols in the laboratory by interpreting signage, maintaining personal hygiene, and implementing first aid procedures when necessary.
- Competently operate essential laboratory instruments like microscopes, centrifuges, balances, autoclaves, and spectrophotometers for various laboratory tasks.
- Accurately perform basic blood tests (blood group typing, hemoglobin estimation, ESR, PCV) and prepare blood smears for cell counting (RBC, WBC, differential).
- Effectively perform a urinalysis to evaluate physical characteristics and identify normal and abnormal constituents through chemical analysis.

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Blooms taxonomy classification	Cognitive level
CO-1	Recall information and basic concepts - List the steps of a specific laboratory technique.	9, 11	Remembering	01
CO-2	Grasp fundamental principles and concepts - Explain the purpose of quality control in laboratory testing.	9	Understanding	02
CO-3	Apply knowledge to solve problems and scenarios - Perform a blood smear preparation following standard protocols.	1,9	Applying	03
CO-4	Break down complex information and identify relationships - Analyze laboratory test results to identify potential errors and - Identify the	6	Analyzing	04

	factors that may affect the accuracy of a test.			
CO-5	Make judgments, critiques, and informed decisions - Evaluate the reliability of different laboratory techniques and - Assess the effectiveness of a laboratory procedure in diagnosing diseases.	11	Evaluating	05
CO-6	Synthesize information to generate new ideas or hypotheses - Design a new laboratory protocol to improve efficiency and accuracy and - Propose innovative methods for sample collection and processing.	9	Creating	06

Course Title: **Practical DSC-02 ZO-112**
Practical of ZO-111 Fundamentals of Medical Laboratory Techniques

Course Objectives

- Gain proficiency in basic laboratory techniques like glassware washing and interpreting laboratory signage for efficient and safe work practices.

- Understand and adhere to safety regulations, learn first-aid procedures, and maintain accurate clinical laboratory records to ensure a safe and organized laboratory environment.

- Develop practical skills in using essential medical laboratory instruments like microscopes, centrifuges, balances, autoclaves, and spectrophotometers.
- Learn and perform fundamental laboratory tests, including blood group typing, hemoglobin estimation, ESR, PCV, cell counts (RBC, WBC,

differential), and basic urinalysis for physical examination and chemical analysis.

Course Outcomes

- Effectively wash glassware and utilize laboratory signage to ensure a clean and safe workspace.
- Demonstrate adherence to safety regulations, apply first-aid procedures when necessary, and maintain accurate clinical laboratory records.
- Competently operate essential laboratory instruments (microscopes, centrifuges, balances, autoclaves, spectrophotometers) for various laboratory tasks.
- Accurately perform basic blood tests (blood group typing, hemoglobin estimation, ESR, PCV, cell counts) and basic urinalysis (physical examination, chemical analysis) to identify normal and abnormal parameters.
- Gain firsthand experience by visiting a pathology laboratory and observing professional laboratory operations.

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Blooms taxonomy classification	Cognitive level
CO-1	Recall information and basic concepts - List the steps of a specific laboratory technique.	9, 11	Rememberin g	01
CO-2	Grasp fundamental principles and concepts - Explain the purpose of quality control in laboratory testing.	9	Understandin g	02
CO-3	Apply knowledge to solve problems and scenarios - Perform a blood smear preparation following standard protocols.	1,9	Applying	03
CO-4	Break down complex information and identify relationships - Analyze	6	Analyzing	04

	laboratory test results to identify potential errors and - Identify the factors that may affect the accuracy of a test.			
CO-5	Make judgments, critiques, and informed decisions - Evaluate the reliability of different laboratory techniques and - Assess the effectiveness of a laboratory procedure in diagnosing diseases.	11	Evaluating	05
CO-6	Synthesize information to generate new ideas or hypotheses - Design a new laboratory protocol to improve efficiency and accuracy and - Propose innovative methods for sample collection and processing.	9	Creating	06

Course Title: **Vermitechnique OE-1 ZO- 113 Vermitechnique**

Course Objectives

- Gain fundamental knowledge of Vermitechnology, including earthworm anatomy and physiology, vermicomposting methods (pit and bed methods), and its applications in waste management.
- Develop practical skills in harvesting worms (manual, migration, mechanical methods), collecting and utilizing vermicast (worm castings), vermicompost (composted material), and vermiwash (liquid extract).
- Understand how earthworms contribute to soil fertility, analyze the benefits of vermicompost for crop production and land improvement, and appreciate their role in waste management and bioremediation.

- Critically analyze the economics of vermicomposting, including marketing strategies for vermicomposting products, financial support options (KVIC, NABARD), and eligibility criteria for financial aid.

Course Outcomes

- Articulate the principles of Vermitechnology, describe earthworm anatomy, and explain different vermicomposting methods for organic waste management.
- Competently harvest worms using various methods, collect and utilize vermicast, vermicompost, and vermiwash for different applications.
- Critically evaluate how earthworm activity contributes to soil fertility, explain the benefits of vermicompost in crop production and land reclamation, and discuss their role in waste management and bioremediation processes.
- Evaluate the economic feasibility of vermicomposting, propose marketing strategies for vermicomposting products, and identify potential financial support options (KVIC, NABARD) with their eligibility criteria.

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Blooms taxonomy classification	Cognitive level
CO-1	This subject will describe soil earthworms, their characteristic features, occurrence, their influence on soil fertility and solid waste management.	9, 11	Remember	01
CO-2	Provides knowledge of developing vermicompost unit for the production of vermicompost and vermiwash	9	Understand	02
CO-3	Provides employment opportunities	1,9	Understand	02
CO-4	Develops practice of converting rural and urban biowastes into excellent manure.	6	Apply	03
CO-5	Enhance Green revolution	11	Remember	01

Semester II

Course Title: Forensic Zoology DSC-03 ZO-121 Forensic Zoology

Course Objectives

- Develop an understanding of how zoological principles and analysis of insect evidence contribute to forensic investigations.
- Gain practical skills in recognizing and analyzing biological evidence such as hair, teeth, blood, semen, and saliva for forensic purposes.
- Learn various techniques for collecting and examining insect evidence at crime scenes, including blow flies, dermestid beetles, and other relevant insects, to estimate time of death.
- Gain basic knowledge of forensic medicine and medical jurisprudence, including legal aspects of documenting medical evidence for court proceedings.

Course Outcomes

- Demonstrate an understanding of how zoological evidence contributes to solving crimes, identifying perpetrators, and reconstructing events.
- Competently identify and analyze different types of biological evidence (hair, teeth, blood, semen, saliva) with potential forensic significance.
- Effectively collect and examine insect evidence at crime scenes, focusing on blow flies, dermestid beetles, and other relevant insects, to estimate the post-mortem interval.
- Explain the basic principles of forensic medicine and medical jurisprudence, highlighting the importance of accurate and legally compliant medical evidence documentation.

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Blooms taxonomy classification	Cognitive level
CO-1	Understand the basics principles of Forensic Zoology.	9, 11	Remember	01

CO-2	Understand scientific methods in crime detection.	9	Understand	02
CO-3	Understand the advancements in the field of Forensic Zoology.	1,9	Understand	02
CO-4	Apply modern tools, techniques, and skills in forensic investigations.	6	Apply	03
CO-5	Describe the fundamental principles and functions of forensic science and its significance to human society.	11	Remember	01

Course title: DSC-4: Practical DSC-4

ZO-122: Practical of Forensic Zoology

Course Objectives

- Develop practical skills in examining and analyzing biological evidence, including human hair (morphology, species identification), blood (detection and grouping), and semen (identification tests), for use in forensic investigations.
- Learn and practice techniques for observing and interpreting insect evidence (blow fly and dermestid beetle life cycles) to estimate the post-mortem interval in crime scenes.
- Gain practical experience in preparing evidence casts (footprints) and analyzing microscopic evidence (diatoms) for forensic applications.
- Apply knowledge of forensic entomology and wildlife forensics to real-world scenarios by preparing case reports on these topics and visiting a forensic laboratory to observe professional practices.

Course Outcomes

- Skilled in examining human hair morphology, preparing slides for scale pattern analysis, and differentiating fingerprint types.

- Competently detect blood presence, perform blood grouping tests (limited to practical scope), and utilize the acid phosphatase test for semen identification.
- Effectively observe and interpret insect development stages (blow flies, dermestid beetles) to estimate the post-mortem interval at crime scenes.
- Demonstrate skills in preparing casts of footprints, performing microscopic analysis of diatoms (citing relevant case studies), and writing comprehensive case reports on forensic entomology and wildlife forensics. Note: The practicality of performing some techniques (e.g., blood grouping) may vary depending on the course level and safety considerations.

CO No.	**Upon completion of this course, students will be able to:**	**PSO addressed**	**Blooms taxonomy classification**	**Cognitive level**
CO-1	Understand the basics principles of Forensic Zoology.	9, 11	Remember	01
CO-2	Understand scientific methods in crime detection.	9	Understand	02
CO-3	Understand the advancements in the field of Forensic Zoology.	1,9	Understand	02
CO-5	Describe the fundamental principles and functions of forensic science and its significance to human society.	11	Remember	01
CO-4	Apply modern tools, techniques, and skills in forensic investigations.	6	Apply	03

Course Title-Public health and hygiene

OE-02 ZO-123: Public health and hygiene

Course Objectives

- Develop an understanding of nutrition principles, balanced diets, and dietary needs for different life stages (infants, children, adults, pregnancy, and lactation), promoting healthy eating practices for disease prevention.
- Gain knowledge of common food-borne and water-borne diseases (causes, symptoms, transmission), and apply strategies for prevention and control.
- Learn and practice essential personal hygiene habits (body care, oral hygiene, sleep hygiene) and understand the importance of social hygiene (cleanliness, occupational hygiene, food safety) for public health.
- Understand the negative health impacts of excessive technology use and unhealthy habits (smoking, alcoholism, drug abuse) and explore positive lifestyle choices like physical activity (cycling, walking), stress management (yoga), and responsible family planning practices.

Course Outcomes

- Demonstrate the ability to design balanced meal plans considering calorie needs and dietary requirements for different individuals and life stages.
- Effectively communicate the causes, symptoms, and prevention strategies for common food-borne and water-borne diseases.
- Competently demonstrate essential personal hygiene practices and advocate for social hygiene initiatives in the community.
- Articulate the negative health consequences of unhealthy habits and positively promote physical activities like cycling and walking, stress management techniques (yoga), and responsible family planning methods.

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Blooms taxonomy classification	Cognitive level
CO-1	Students will get a holistic overview of the interdisciplinary nature of Public health and hygiene	9, 11	Remember	01
CO-2	Understand public health and hygiene issues in India particularly related to Malnutrition, sanitation issues and related burden of infectious disease, and the role of pollution as a public health concern.	9	Understand	02
CO-3	Understand the public policies applicable and implemented in India.	1,9	Understand	02
CO-4	Apply the known knowledge to adopt health and hygiene.	6	Apply	03
CO-5	Recall to appreciate the social aspects that govern many public health issues and implementation of policies	11	Remember	01

Department of Zoology

S.Y.B.S Program Outcomes (PO)

PO-1	Thorough knowledge and understanding of the theories, models, concepts and principles of zoology and related zoological applications.
PO-2	Recognize the relationship between parts of different species, our physical, biological and cultural environment.
PO-3	Gain an understanding of the evolutionary history and key characteristics of animal groups.
PO-4	Understanding and critical analysis of population processes, dynamics and interactions, and related models.
PO-5	Comprehend the ecosystem, biogeography, diversity, and correlation with climatic, paleo-historic and evolutionary factors.

Program Specific Outcomes (PSO):

PSO No.	On completion of B.Sc. Zoology Degree Programme, the graduates will be able to:	Mapping
PSO-1	To know the basic principles of zoology. Recognition, the relationship between structure and function, and biological organization of animals.	PO-2
PSO-2	Analyze animal theory, classification, form and function, and evolution, and compare the structures of prokaryotes and eukaryotes.	PO-3
PSO-3	Understand the diversity of animals with taxonomy and the classification of animals with diagnostic features.	PO-2
PSO-4	Apply knowledge and understanding of conservation and restoration Biodiversity, ecological integrity, and health.	PO-5
PSO-5	To understand practical biological sciences such as sericulture, Fish farming and beekeeping	PO-1
PSO-6	Collect, record and analyze data using relevant environmental, genetic, Physiological methods in the field and in the laboratory.	PO-3

PSO-7	Effectively use information technology systems to analyze and interpret Review of information and evidence.	PO-3
PSO-8	Develop writing skills required in this program; publish research papers, oral presentations and conference posters.	PO-1
PSO-9	Describe the molecular and cellular basis of animal physiological functions.	PO-3
PSO-10	Provide innovative skills which will enable the knowledge and skills required for employment.	PO-2
PSO-11	Perform practical skills in the areas of basic and applied zoology	PO-1

SEMESTER III

Course Title/Code: DSC-5 Parasitology

Course Objectives:

● Students will able Explain the fundamental concepts of parasitology, including types of parasites, host-parasite relationships, and modes of transmission.

● Recognize important protozoan parasites, and describe their life cycles, morphology, and adaptations.

● Students will know the important helminth parasites, and describe their life cycles, morphology, and adaptations.

● Recognize important arthropod parasites, and describe their life cycles, morphology, and adaptations.

● Examine the impact of parasitic infections on host physiology, immunity, and disease transmission dynamics.

● Learn about diagnostic techniques, treatment options, and strategies for the prevention and control of parasitic diseases.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall fundamental concepts of parasitology, including parasite types, host classifications, and host-parasiteinteractions.	9, 11	Remembering	01
CO-2	Explain the basic principles of parasitism, symbiosis, commensalism, mutualism, and their significance in biological systems.	9	Understanding	02
CO-3	Apply knowledge to classify parasites (ecto-, endo-, intermediate, definitive, and reservoir) and identify their roles in disease transmission.	1, 9	Applying	03
CO-4	Analyze the morphology, life cycle, pathogenicity, and control measures of medically important parasites and parasitic arthropods.	6	Analyzing	04
CO-5	Evaluate diagnostic techniques and control strategies for managing parasitic infections in humans and animals.	11	Evaluating	05

CO-6	Develop innovative parasite control measures and propose integrated strategies for sustainable parasitic disease management.	9	Creating	06

Course Title/Code: DSC-6 Ethnozoology

Course Objectives:

- Explain the historical background, origin, and significance of ethnozoology in human societies.
- Describe the role of animals in Indian traditions, including myths, symbols, and sacred beliefs.
- Examine the medicinal uses of animal-derived products in traditional and modern healthcare.
- Assess the impact of ethnozoological practices on biodiversity conservation and sustainable resource utilization.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the fundamental concepts, history, and significance of ethnozoology.	9, 11	Remembering	01
CO-2	Explain the cultural and religious significance of animals in Indian traditions, including myths, vahanas, and sacred symbols.	9	Understanding	02

CO-3	Apply knowledge to identify and categorize various zoo-therapeutic practices and their applications in traditional medicine.	1, 9	Applying	03
CO-4	Analyze the role of animals in historical and modern contexts, including their representation on flags, pillars, and religious texts.	6	Analyzing	04
CO-5	Evaluate the ethical, ecological, and conservation-related concerns associated with ethnozoological practices.	11	Evaluating	05
CO-6	Develop sustainable and culturally sensitive approaches for integrating traditional animal-based knowledge with modern conservation efforts.	9	Creating	06

DSC-07 Practicals of ZO-211 and 212 Parasitology and Ethnozoology

Course Objectives

- Explain the structural characteristics and developmental stages of key protozoan, helminthic, and arthropod parasites using permanent slides and charts.
- Examine the significance of animals in Indian traditions, including myths, religious symbols, and sacred associations.
- Assess the impact of parasitic organisms on human and animal health, including their transmission and control.
- Conduct field visits to temples, slaughterhouses, and natural habitats to observe the real-world application of ethnozoological concepts and parasitology.

Course Outcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the morphology and life cycle of major protozoan, helminthic, and arthropod parasites using permanent slides and charts.	9, 11	Remembering	01
CO-2	Explain the cultural and religious significance of animals in Indian traditions, including myths, vahanas, and sacred symbolism.	9	Understanding	02
CO-3	Apply knowledge to identify parasites and their pathogenic effects in medical and veterinary contexts.	1, 9	Applying	03
CO-4	Analyze the transmission, pathogenicity, and control measures of key parasites affecting humans and animals.	6	Analyzing	04
CO-5	Evaluate the conservation and ethical aspects of using animals in traditional and religious practices.	11	Evaluating	05
CO-6	Conduct field studies and propose sustainable approaches to integrate traditional knowledge with modern parasitological research.	9	Creating	06

Course Category/ Title: **MIN-1 Animal type - Grasshopper**	
Course code: **ZO- 214**	Course Credit: **2 -** L-T-P per week: **2-0-0**
Total Contact Hours: 30	**Duration of Lecture :1 Hour**
College Assessment (CA) Marks:20	**University Assessment (UA) Marks:30**

Course Objectives

- Explain external features, sexual dimorphism, and physiological adaptations in various environments of Grasshoppers.
- Describe the digestive, respiratory, circulatory, nervous, and excretory systems of grasshoppers and their roles in survival.
- Assess their impact on agriculture, ecosystems, and their role in food chains.
- Understand the developmental stages and reproductive mechanisms of grasshoppers.

Course Outcomes;

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the external features, sexual dimorphism, and physiological adaptations of grasshoppers.	9, 11	Remembering	01
CO-2	Explain the structure and function of various organ systems, including digestion, respiration, circulation, nervous control, and excretion.	9	Understanding	02

CO-3	Apply knowledge to identify the economic significance of grasshoppers in agriculture and ecosystems.	1, 9	Applying	03
CO-4	Analyze the reproductive system and life cycle stages, including egg, nymph, and adult development.	6	Analyzing	04
CO-5	Evaluate the impact of grasshoppers on crop production and propose management strategies for pest control.	11	Evaluating	05
CO-6	Develop insights into how grasshopper adaptations contribute to their survival and ecological success.	9	Creating	06

Course Category/ Title: **MIN-2 Ecology**	
Course Code: ZO -215	Course Credits: **2** L-T-P per week**: 2-0-0**
Total Contact Hours: 30	**Duration of Lecture:** 1 Hour
College Assessment (CA) Marks: 20	**University Assessment (UA) Marks:**30

Course Objectives

- Explain the structure, function, and components of different ecosystems, including energy flow and ecological pyramids.
- Examine food chains, food webs, ecological succession, and niche dynamics.
- Assess population dynamics, life tables, and factors regulating population size.
- Understand biodiversity management, environmental pollution, and global ecological changes.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the basic concepts of ecosystem structure, energy flow, and ecological pyramids.	9, 11	Remembering	01
CO-2	Explain ecological succession, food chains, food webs, and population ecology dynamics.	9	Understanding	02

CO-3	Apply ecological principles to analyze population growth, migration, and environmental resistance.	1, 9	Applying	03
CO-4	Break down ecological interactions, including niche types, ecotones, and the edge effect.	6	Analyzing	04
CO-5	Evaluate biodiversity threats, environmental pollution, and global ecological challenges.	11	Evaluating	05
CO-6	Propose strategies for biodiversity conservation and sustainable ecosystem management.	9	Creating	06

Course Category/ Title: **MIN-3 Practicals of Animal Type – Grasshopper and Ecology**	
Course Code: ZO -216	Course Credits: **2** L-T-P per week: **0-0-4**
Total Contact Hours: 30	**Duration of Lecture: 1 Hour**
College Assessment (CA) Marks: 20	**University Assessment (UA) Marks:**30

Course Objectives

- Identify external features, sexual dimorphism, and major organ systems.
- Study the digestive, circulatory, nervous, and reproductive systems in detail.
- Understand the metamorphosis of grasshoppers, from egg to adult.
- Conduct estimations of oxygen, carbon dioxide, alkalinity, and hardness in freshwater samples.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the external morphology and sexual dimorphism of grasshoppers.	9, 11	Remembering	01
CO-2	Explain the structure and function of digestive, circulatory, nervous, and reproductive systems.	9	Understanding	02

CO-3	Apply mounting techniques to study mouthparts, wings, legs, and internal structures.	1, 9	Applying	03
CO-4	Analyze the life cycle stages of grasshoppers and their developmental processes.	6	Analyzing	04
CO-5	Evaluate water quality parameters such as oxygen content, carbon dioxide, alkalinity, and hardness.	11	Evaluating	05
CO-6	Conduct field studies to analyze aquatic and terrestrial ecosystems.	9	Creating	06

Course Category/ Title: **OE -3 Ornamental Fish Culture**	
Course Code: ZO -217	Course Credits: **2** L-T-P per week: **2-0-0**
Total Contact Hours: 30	**Duration of Lecture: 1 Hour**
College Assessment (CA) Marks: 20	**University Assessment (UA) Marks:30**

Course Objectives

- Learn about the history, importance, and essential components of an aquarium.
- Study the taxonomy, biology, and sexual dimorphism of both exotic and indigenous ornamental fishes.
- Understand broodstock management, induced breeding, and feeding strategies for ornamental fish.
- Learn about the symptoms, treatment, and preventive measures for diseases in aquarium fish.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the essential components and design principles of an aquarium.	9, 11	Remembering	01
CO-2	Explain the biological characteristics and classification of common ornamental fishes.	9	Understanding	02
CO-3	Apply techniques for setting up and maintaining a functional aquarium environment.	1, 9	Applying	03

CO-4	Analyze breeding and rearing conditions for ornamental fishes.	6	Analyzing	04
CO-5	Evaluate water quality management practices and disease prevention strategies in aquariums.	11	Evaluating	05
CO-6	Develop a sustainable breeding and maintenance plan for ornamental fishes.	9	Creating	06

Course Category/ Title: **SEC-1 ZO -218 Pearl Culture Techniques**	
Course Code: ZO -218	Course Credits: **2** L-T-P per week: **2-0-0**
Total Contact Hours: 30	**Duration of Lecture:** 1 Hour
College Assessment (CA) Marks: 20	**University Assessment (UA) Marks:** 30

Course Objectives

- Learn about the types of pearls, pearl-producing mollusks, and major pearl farming regions in India.
- Study the chemical composition, classification, physical properties, and factors influencing pearl formation.
- Gain knowledge of mussel selection, surgical procedures, graft preparation, nucleus implantation, and harvesting methods.

  Assess the market trends, demand, pricing, and recent advancements in freshwater pearl farming in India.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the basic concepts of pearl formation and types of pearls.	9, 11	Remembering	01
CO-2	Explain the biological and chemical properties of pearls.	9	Understanding	02
CO-3	Apply techniques for pearl implantation and harvesting.	1, 9	Applying	03
CO-4	Analyze the factors influencing nacre secretion and pearl quality.	6	Analyzing	04

CO-5	Evaluate the economic aspects and marketing strategies of pearl farming.	11	Evaluating	05
CO-6	Propose innovative techniques for improving pearl quality and sustainability.	9	Creating	06

Course Category/ Title: **SEC-2 Practicals of Pearl Culture Techniques**	
Course Code: ZO -219	Course Credits: **2** L-T-P per week: **0-0-4**
Total Contact Hours: 30	**Duration of Lecture:** 1 Hour
College Assessment (CA) Marks: 20	**University Assessment (UA) Marks:** 30

Course Objectives

- Learn about the types, formation, and biological aspects of pearl-producing mollusks.
- Study the chemical composition, classification, and physical properties of pearls.
- Understand surgical procedures, graft tissue preparation, and post-surgical care in pearl farming.
- Assess market trends, pricing factors, and the economic viability of pearl culture in India.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the basic concepts of pearl formation and types of pearls.	9, 11	Remembering	01

CO-2	Explain the biological and chemical properties of pearls.	9	Understanding	02
CO-3	Apply techniques for pearl implantation and harvesting.	1, 9	Applying	03
CO-4	Analyze the factors influencing nacre secretion and pearl quality.	6	Analyzing	04
CO-5	Evaluate the economic aspects and marketing strategies of pearl farming.	11	Evaluating	05
CO-6	Propose innovative techniques for improving pearl quality and sustainability.	9	Creating	06

SEMESTER IV

Course Category/ Title: **DSC-8 Agricultural Pest management**	
Course Code: **ZO- 221**	Course Credits: **2** L-T-P per week: **2-0-0**
Total Contact Hours: **30**	Duration of Lecture: **1 Hour**
College Assessment (CA) Marks: **20**	University Assessment (UA) Marks: **30**

Course Objectives

- Learn about different types of agricultural pests, their identification, and their impact on crops.
- Study various pest control techniques, including chemical, biological, and integrated pest management (IPM).
- Assess the cost-benefit analysis and ecological consequences of pest control methods.
- Investigate eco-friendly pest management practices used in organic farming.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the classification and characteristics of agricultural pests.	9, 11	Remembering	01
CO-2	Explain the life cycle, nature of damage, and control measures of major insect pests.	9	Understanding	02
CO-3	Apply knowledge to identify and implement appropriate pest control measures.	1, 9	Applying	03
CO-4	Analyze the economic and environmental impact of pest control methods.	6	Analyzing	04
CO-5	Evaluate the effectiveness of different pest management strategies, including IPM and organic methods.	11	Evaluating	05
CO-6	Develop sustainable pest management plans incorporating eco-friendly practices.	9	Creating	06

Course Category/ Title: **DSC-9 Practicals corresponding to Agricultural Pest management**	
Course Code: **ZO- 222**	Course Credits: **2** L-T-P per week: **0-0-4**
Total Contact Hours: **60**	Duration of Lecture: **1 Hour**
College Assessment (CA) Marks: **20**	University Assessment (UA) Marks:**30**

Course Objectives:

- Learn about the life cycle, nature of damage, and control measures of key agricultural pests.

- Study and compare different pest control methods, including biological, chemical, and integrated pest management (IPM).
- Understand the principles of pesticide application, formulation, and their impact on food safety.
- Gain hands-on experience in pest collection, identification, and preservation techniques.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the life cycle, nature of damage, and control measures of major agricultural pests.	9, 11	Remembering	01
CO-2	Explain the principles and applications of various pest control techniques, including IPM and biological control.	9	Understanding	02
CO-3	Apply knowledge to identify and use appropriate pest control measures, including pesticide appliances.	1, 9	Applying	03
CO-4	Analyze the effectiveness of biological control methods using predators and parasitoids in pest management.	6	Analyzing	04
CO-5	Evaluate pesticide residues in foodstuffs and assess the impact of chemical control strategies.	11	Evaluating	05
CO-6	Design an integrated pest management plan by combining different pest control strategies for sustainable agriculture.	9	Creating	06

Course Category/Title: **MIN 4 Animal Type-*Labeo rohita***	
Course Code: **ZO-223**	Corse Credits: **2** L-T-P per week: **2-0-0**
Total Contact Hours: **30**	Duration of Lecture: **1Hour**
College assessment (CA) Marks: **20**	University Assessment(UA):Marks: **30**

Course Objectives:

- Learn about its taxonomy, habit, habitat, and external characteristics.
- Study its digestive, respiratory, circulatory, nervous, and reproductive systems.
- Understand respiration, blood circulation, excretion, and reproductive mechanisms.
- Examine its role in aquaculture, fisheries, and conservation.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the systematic position, habit, habitat, and external characteristics of *Labeo rohita*.	9, 11	Remembering	01
CO-2	Explain the structure and function of the digestive, respiratory, circulatory, nervous, and excretory systems of *Labeo rohita*.	9	Understanding	02
CO-3	Apply knowledge to identify and describe the physiological processes of respiration, digestion, and excretion in *Labeo rohita*.	1, 9	Applying	03

CO-4	Analyze the reproductive system, fertilization process, and embryonic development of *Labeo rohita*.	6	Analyzing	04
CO-5	Evaluate the economic and ecological significance of *Labeo rohita* in fisheries and aquaculture.	11	Evaluating	05
CO-6	Design sustainable management strategies for *Labeo rohita* fisheries based on its biological and ecological traits.	9	Creating	06

Course Category/ Title: **MIN 5 Practicals based on Animal Type-*Labeo rohita***	
Course Code: **ZO-224**	Corse Credits: **2** L-T- P per week: **0-0-4**
Total Contact Hours: **60**	Duration of Lecture: **1 Hour**
College assessment (CA) Marks: **20**	University Assessment(UA):Marks: **30**

Course Objectives

- Learn about its classification, habit, habitat, and external characteristics.
- Study the structure and function of the digestive, circulatory, respiratory, nervous, and excretory systems.
- Understand the male and female reproductive systems, fertilization, and embryonic development.
- Evaluate the role of *Labeo rohita* in aquaculture, fisheries, and sustainable fish farming.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the systematic position, habit, habitat, and external features of *Labeo rohita*.	9, 11	Remembering	01
CO-2	Explain the structure and function of the digestive, circulatory, respiratory, nervous, and excretory systems.	9	Understanding	02
CO-3	Apply knowledge to perform anatomical studies, such as temporary preparations of scales, eyeballs, and air bladders.	1, 9	Applying	03
CO-4	Analyze the reproductive system of *Labeo rohita*, including the differences between male and female systems.	6	Analyzing	04
CO-5	Evaluate the importance of *Labeo rohita* in aquaculture, fisheries, and its economic significance.	11	Evaluating	05
CO-6	Design sustainable fish culture techniques based on the biological and ecological characteristics of *Labeo rohita*.	9	Creating	06

Course Category/Title: **OE-4 Sericulture**	
Course Code: **OE-4 ZO-225**	Course Credits: **2** T-L-P per week: **2-0-0**
Total Contact Hours: 30	Duration of Lecture: **1 Hour**
College assessment (CA) Marks: 20	**University Assessment (UA): Marks: 30**

Course Objectives

- Learn about the history, scope, taxonomic classification, and different types of silkworms.
- Study the external and internal morphology, silk gland structure, and digestive system.
- Understand propagation techniques, rearing methods, and the use of rearing appliances.
- Identify major diseases and pests affecting silkworms and develop control strategies.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the history, scope, and classification of sericulture, along with different types of silkworms.	9, 11	Remembering	01
CO-2	Explain the life cycle, morphology, and physiological processes of *Bombyx mori*, including silk gland function.	9	Understanding	02

CO-3	Apply knowledge of mulberry cultivation and silkworm rearing techniques, including the use of rearing appliances.	1, 9	Applying	03
CO-4	Analyze the impact of environmental factors on silkworm growth, silk production, and disease susceptibility.	6	Analyzing	04
CO-5	Evaluate pest and disease management strategies to improve silk production and prevent economic losses.	11	Evaluating	05
CO-6	Design innovative sericulture practices to enhance productivity and sustainability in silk farming.	9	Creating	06

Course Category/Title: **VC-1 Economic Zoology**	
Title of the Paper**: ZO-226**	Course Credit**: 2** L-T-P per week: **2-0-0**
Total Contact Hours: **30**	Duration of Lecture:**1 Hour**
College Assessment (CA) Marks: **20**	University Assessment (UA) Marks:**30**

Course Objectives

- Learn the definition, scope, and significance of economic zoology in various industries such as lac culture, poultry, and goat farming.
- Study the life cycle, morphology, secretion process, cultivation, and economic importance of lac insects.
- Understand the classification, feeding strategies, common diseases, and management practices in poultry and goat farming.

- Assess the role of lac culture, poultry, and goat farming in India's economy and their impact on sustainable livelihoods.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the definition, scope, and applications of economic zoology in various industries.	9, 11	Remembering	01
CO-2	Explain the life cycle, morphology, and cultivation techniques of lac insects.	9	Understanding	02
CO-3	Apply knowledge of poultry and goat farming techniques, including breed selection and disease management.	1, 9	Applying	03
CO-4	Analyze the impact of feeding strategies, environmental conditions, and disease control measures on poultry and goat health.	6	Analyzing	04
CO-5	Evaluate the economic contributions of lac culture, poultry, and goat farming in India.	11	Evaluating	05
CO-6	Propose innovative farming techniques to improve productivity and sustainability in lac culture, poultry, and goat farming.	9	Creating	06

Course Code/ Title: **VC-2 Practicals of Economic Zoology**	
Title of the Paper**: ZO-227**	Course Credit**: 2** L-T-P per week: **0-0-4**
Total Contact Hours: **60**	Duration of Lecture: **1 Hour**
College Assessment (CA) Marks: **20**	University Assessment (UA) Marks: **30**

Course Objectives

- Learn about different species of lac insects, their life cycle, and the techniques of lac rearing and cultivation.
- Study different goat breeds, their feeding and nutritional requirements, and their role in sustainable agriculture.
- Identify poultry breeds, study common poultry diseases, and understand farm management techniques.

  Assess the contributions of lac culture, goat farming, and poultry farming to rural development and food security.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the species, life cycle, and rearing techniques of lac insects.	9, 11	Remembering	01
CO-2	Explain the nutritional requirements, feed formulation, and importance of goats in sustainable agriculture.	9	Understanding	02
CO-3	Apply knowledge of poultry farm design, equipment, and disease control strategies.	1, 9	Applying	03
CO-4	Analyze the impact of diseases and parasites on poultry and goat farming, and identify control measures.	6	Analyzing	04
CO-5	Evaluate different lac products (shellac, dye, wax) and their economic significance.	11	Evaluating	05

CO-6	Design improved techniques for lac cultivation, goat nutrition, and poultry farm management to enhance productivity.	9	Creating	06

Course Category/ Title: **OJT / INT. corresponding to the Major (Core) Subject**	
Title of the Paper**: ZO 228**	Course Credit**: 4** L-T-P per week: **0-0-8**
Total Contact Hours: **120**	Duration of Lecture: **1 Hour**
College Assessment (CA) Marks: **40**	University Assessment (UA) Marks: **60**

Course Objectives

- Students will demonstrate the ability to formulate a research question, conduct literature reviews, and design and execute a zoological research project.
- Students will gain hands-on experience through field studies, study tours, and/or on- the-job training, applying zoological knowledge to real-world scenarios.
- Students will effectively communicate research findings through written reports, oral presentations, and visual documentation.
- Students will analyze and interpret zoological data, synthesize information from various sources, and apply their knowledge to address biological problems.

Students need to complete one month on job training (OJT) or internship (Int.) in any industry related to major subject.

On-the-job training in zoology provides practical skills, exposure to real-world scenarios, and networking opportunities within the field. It enhances participants' employability, allows them to explore specific areas of interest, and complements their academic knowledge with practical experience. It is important to note that the availability of on-

the-job training programs may vary based on geographical location and the specific institutions and organizations within the field of zoology.

T. Y. B. Sc. ZOOLOY (CBCS Structure)

(With Effect from June 2020)

Semester V and VI

Learning Objectives:

 To provide thorough knowledge about animal classification and associated taxonomic groups various animal sciences from primitive to highly evolved animal groups.

 To develop an understanding of and ability to apply basic zoological principles.

 To provide quality education in different specializations in Zoology.

 To facilitate higher education and research in zoology.

 To make the students aware of applications of Zoology subject in various industries

 To equip the students with skills related to laboratory as well as field based studies.

 To make the students aware about conservation and sustainable use of biodiversity.

 To inculcate interest and foundation for further studies in Zoology.

 To address the socio-economical challenges related to animal sciences.

 To provide quality education offering skill based programs and motivate the students for self-employment in applied branches of Zoology.

Program specific objectives (PSO)

 To achieve excellence in academic and scientific research in the field of Zoology.

 To develop and implement ways and means to ensure quality performance and Outputs of Zoology program.

 To use modern technology in education and scientific research in Zoology.

 To implement advanced training to improve the skills of graduates in Zoology and related fields.

 To create academic and scientific environment to attract outstanding faculty, researchers and students.

 To improve the national and international partnerships with academic institutions and research centers.

Program outcome (PO)

 To possess a good command of fundamentals in Zoology and its relationship to other disciplines.

 To know the theories and scientific facts in the sections of Zoology and interrelations among organisms and their biosphere

 To memorize the concepts of laboratory management, organization and evaluation.

 To recognize the management and concepts of bio-systems, organization and evaluation.

 To outline the policy and legislation of animal Science and ethics.

 To design and conduct experiments in Zoology

 To communicate effectively through writing reports, giving presentations, and participating in discussions.

 To demonstrate skill in the usage of computers, networks, and software packages relevant to Zoology

 To learn the principles of research methodology.

Course outcome (CO)

 Describe the diversity in form, structure and habits of invertebrates and vertebrates

 Explain the reproductive patterns in animal world

 Develop deeper understanding of life is and how it functions at cellular level as well as histological structure of tissues.

 Understand applications of animal biotechnology, bioinformatics and research methodology

 Familiar with various stages involved in the developing embryo

 Acquire skills in the microtechniques, apiculture, sericulture and other applied branches of Zoology.

Semester V

ZOO-501: Reproductive Endocrinology

✅ **Programme Outcomes (POs) – Suggested (Generic for PG Zoology)**

1. **PO1:** Understanding of advanced biological systems and their interactions.
2. **PO2:** Apply core concepts of zoology to experimental and research settings.
3. **PO3:** Develop scientific temper and analytical reasoning in reproductive biology.

4. **PO4:** Understand and evaluate the impact of endocrine systems on health and disease.
5. **PO5:** Develop practical knowledge and skills for careers in academics, research, or medical labs.

✅ Course Outcomes (COs) – For ZOO-501

1. **CO1:** Explain the definition and scope of reproductive endocrinology.
2. **CO2:** Describe the structure, histology, and functions of pituitary, thyroid, and adrenal glands.
3. **CO3:** Analyze the histology and endocrine control of testis and ovary.
4. **CO4:** Compare oestrous and menstrual cycles and explain hormonal regulation.
5. **CO5:** Illustrate hormonal control of pregnancy, parturition, lactation, and fertility.

✅ CO-PO Mapping Matrix (with Legend)

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	1	1
CO2	3	3	3	2	2
CO3	3	3	3	3	2

COs	PO1	PO2	PO3	PO4	PO5
CO4	2	2	3	3	2
CO5	2	3	3	3	3

Legend:

- **3 – High correlation**
- **2 – Medium correlation**
- **1 – Low correlation**
- **0 – No correlation**

ZOO-502: Cell and Molecular Biology (CMB)

✅ Programme Outcomes (POs) – Suggested (Generic for PG Zoology)

1. **PO1:** Understand advanced biological concepts in cell and molecular systems.
2. **PO2:** Apply theoretical and practical knowledge in cellular and molecular biology.
3. **PO3:** Analyze and interpret mechanisms of heredity, gene regulation, and protein synthesis.
4. **PO4:** Demonstrate problem-solving and research skills in biotechnology and life sciences.
5. **PO5:** Develop laboratory skills, scientific reasoning, and communication in modern biology.

✅ Course Outcomes (COs) – For ZOO-502

1. **CO1:** Explain the structure and function of cells and organelles in prokaryotes and eukaryotes.
2. **CO2:** Describe the process and regulation of cell division and signal transduction pathways.
3. **CO3:** Summarize the structure, types, and replication of nucleic acids.
4. **CO4:** Explain mechanisms of transcription, translation, and protein synthesis in eukaryotes.
5. **CO5:** Understand eukaryotic gene regulation through enhancers, silencers, and epigenetic control.

✅ CO-PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	2	3	3	3	2
CO3	3	2	3	2	2
CO4	3	2	3	3	3
CO5	2	3	3	3	2

Legend:

- **3 – High correlation**
- **2 – Medium correlation**
- **1 – Low correlation**
- **0 – No correlation**

Zoo - 503: Mammalian Histology

✅ Programme Outcomes (POs) – Suggested

1. **PO1:** Gain deep understanding of mammalian tissue structure and functions.
2. **PO2:** Develop histological skills for medical and biological applications.
3. **PO3:** Interpret cellular and organ system functions using microscopic evidence.
4. **PO4:** Prepare for careers in teaching, research, lab work, and diagnostics.
5. **PO5:** Understand integration of structure-function relationship in mammalian systems.

✅ Course Outcomes (COs) – For ZOO-503

1. **CO1:** Describe types of tissues, their classification, and origin from germ layers.
2. **CO2:** Explain histological structure of digestive and respiratory systems.
3. **CO3:** Analyze circulatory and excretory systems histologically.
4. **CO4:** Identify key structures in nervous system and sense organs through histological sections.
5. **CO5:** Describe histology of reproductive and endocrine organs and their functional relevance.

✅ CO-PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	3	3	3	2	2

COs	PO1	PO2	PO3	PO4	PO5
CO3	3	3	3	3	3
CO4	2	3	3	3	2
CO5	3	3	3	3	3

Legend:

- **3 – High correlation**
- **2 – Medium correlation**
- **1 – Low correlation**
- **0 – No correlation**

Zoo - 504: Animal Biotechnology

Programme Outcomes (POs) – Suggested

1. **PO1:** Understand the principles of modern biotechnology and its applications.
2. **PO2:** Gain hands-on knowledge of genetic engineering and molecular tools.
3. **PO3:** Analyze transgenic technology, monoclonal antibody production, and stem cell research.
4. **PO4:** Demonstrate ethical and societal considerations of biotechnological advances.
5. **PO5:** Develop skills for employment in research labs, pharma, diagnostics, and academia.

✅ Course Outcomes (COs) – For ZOO-504

1. **CO1:** Describe the basics of animal biotechnology and tissue culture methods.
2. **CO2:** Understand principles and applications of recombinant DNA technology.
3. **CO3:** Explain the creation and use of transgenic animals.
4. **CO4:** Outline the production and significance of monoclonal and polyclonal antibodies.
5. **CO5:** Evaluate the types, uses, and ethical aspects of stem cell technology.

✅ CO-PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	3	3	3	2	3
CO3	2	3	3	3	2
CO4	2	2	3	3	2
CO5	2	2	3	3	3

Legend:

- **3 – High correlation**
- **2 – Medium correlation**
- **1 – Low correlation**
- **0 – No correlation**

Zoo - 505: Public Health and Hygiene

Programme Outcomes (POs) – Suggested

1. **PO1:** Understand the fundamentals of health, hygiene, and disease prevention.
2. **PO2:** Recognize the environmental and lifestyle factors affecting human health.
3. **PO3:** Apply knowledge of communicable and non-communicable diseases to promote community health.
4. **PO4:** Develop awareness about sanitation, nutrition, and personal hygiene.
5. **PO5:** Prepare for careers or higher education in public health, environmental biology, or social health work.

✅ Course Outcomes (COs) – For ZOO-505

1. **CO1:** Explain the importance of hygiene, food classification, and nutrition in public health.
2. **CO2:** Describe environmental pollution and its role in health hazards.
3. **CO3:** Understand sanitation and waste disposal techniques and their importance.
4. **CO4:** Identify major communicable diseases and explain their control and prevention.
5. **CO5:** Recognize the causes and prevention of lifestyle-related non-communicable diseases.

✅ CO-PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2

COs	PO1	PO2	PO3	PO4	PO5
CO2	2	3	3	2	2
CO3	3	3	2	3	2
CO4	2	2	3	3	3
CO5	2	3	3	2	3

Legend:

- **3 – High correlation**
- **2 – Medium correlation**
- **1 – Low correlation**
- **0 – No correlation**

DSC Skill Enhancement Course [SEC]

Zoo – 506 (B): Aquarium Fish Keeping

Programme Outcomes (POs) – Suggested

1. **PO1:** Understand the fundamentals of aquarium fish keeping and industry relevance.
2. **PO2:** Identify biology, behavior, and sexing of common ornamental fishes.
3. **PO3:** Apply feeding, maintenance, and disease management techniques for aquarium fishes.
4. **PO4:** Understand the logistics of fish transport and market operations.

5. **PO5:** Prepare a basic business model for an aquarium-based cottage industry.

✅ Course Outcomes (COs) – For ZOO – 506 (B)

1. **CO1:** Explain the scope, varieties, and significance of aquarium fish keeping.
2. **CO2:** Distinguish between common aquarium fishes using biological features and sexual dimorphism.
3. **CO3:** Demonstrate knowledge of feeding methods and formulated feeds.
4. **CO4:** Understand safe and effective transportation of live fishes.
5. **CO5:** Maintain aquaria, treat diseases, and create a working budget for aquarium farming.

✅ CO-PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3
CO2	2	3	3	2	2
CO3	2	2	3	1	2
CO4	1	2	3	3	2
CO5	2	3	3	2	3

Legend:

- **3 – High correlation**
- **2 – Medium correlation**
- **1 – Low correlation**

- **0 – No correlation**

Zoo - 507: Corresponding practical to DSC Zoo 501& Zoo502 (CB)

Programme Outcomes (POs) – Suggested

PO Code	Programme Outcome Description
PO1	Understand basic molecular techniques used in nucleic acid analysis
PO2	Visualize and interpret microscopic and ultrastructural biological materials
PO3	Perform histological analysis of mammalian organs and tissues
PO4	Acquire practical skills in staining, slide preparation, and tissue identification
PO5	Demonstrate safe and ethical laboratory practices

✅ **Course Outcomes (COs) for ZOO – 507**

CO Code	Course Outcome Description
CO1	Estimate nucleic acids (RNA/DNA) quantitatively from biological samples
CO2	Identify and prepare polytene chromosomes from insect larvae
CO3	Interpret electron micrographs related to molecular biology events
CO4	Recognize epithelial, connective, muscular, and nervous tissues from slides
CO5	Analyze histological structure of mammalian organs and endocrine glands

📊 CO-PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	1	0	2	3
CO2	3	2	0	3	2
CO3	3	3	0	2	2
CO4	0	2	3	3	2
CO5	0	3	3	3	2

Legend:

- **3** – Strong correlation
- **2** – Moderate correlation
- **1** – Slight correlation
- **0** – No correlation

Zoo - 508: Corresponding practical to DSC Zoo 502 (MB)& Zoo503

Course Outcomes (COs)

CO Code	Course Outcome (CO)
CO1	Understand and perform the quantitative estimation of nucleic acids (DNA, RNA).
CO2	Prepare and identify polytene chromosomes from insect larvae.
CO3	Interpret electron micrographs related to molecular biology processes.
CO4	Identify and differentiate various epithelial and connective tissues through slides.

CO Code	Course Outcome (CO)
CO5	Perform temporary preparations of basic muscle, nerve, and cartilage tissues.
CO6	Study the histology of mammalian skin, digestive, respiratory, circulatory, reproductive, and endocrine organs.
CO7	Correlate structural details of tissues/organs with their physiological functions.

Program Outcomes (POs) – B.Sc. Zoology (typically)

PO Code	Program Outcome
PO1	Gain knowledge and laboratory skills in fundamental areas of Zoology.
PO2	Understand the structure and function of biological systems.
PO3	Develop problem-solving and analytical skills through experimental practices.
PO4	Develop competency in interpreting scientific data and micrographs.
PO5	Apply knowledge of biology to identify, observe, and evaluate biological samples.
PO6	Promote scientific temperament and ethical practices in biological sciences.

CO-PO Mapping Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	2	2	1
CO2	3	3	2	3	2	1
CO3	2	3	2	3	2	1
CO4	3	3	2	2	3	2
CO5	3	3	3	2	2	2
CO6	3	3	2	2	3	3
CO7	3	3	2	2	3	3

Legend (for CO-PO Mapping)

Level	Meaning
3	Strongly related
2	Moderately related
1	Low relevance
0	Not related or negligible

Zoo - 509: Corresponding practical to DSC Zoo 504

Course Outcomes (COs)

CO Code	Course Outcome (CO)
CO1	Perform quantitative estimation of nucleic acids (DNA and RNA) using standard methods.
CO2	Understand and explain the working and applications of biotechnological instruments like laminar air flow and autoclave.
CO3	Isolate and culture microorganisms using aseptic techniques on various media.
CO4	Demonstrate microbial fermentation techniques for ethanol production.
CO5	Prepare basic culture media for cell, tissue, and organ culture.
CO6	Separate biomolecules such as serum proteins using gel electrophoresis techniques.
CO7	Study models of applied biotechnology like biogas plants and explore real-world biotech setups through field visits.

Program Outcomes (POs) – B.Sc. Zoology (Standard)

PO Code	Program Outcome
PO1	Acquire knowledge of key biological concepts and laboratory techniques.

PO Code	Program Outcome
PO2	Understand structure-function relationships in cells and organisms.
PO3	Develop laboratory and experimental skills.
PO4	Gain analytical skills for interpreting biotechnological and microbiological data.
PO5	Apply theoretical knowledge to real-world problems and industries.
PO6	Promote scientific reasoning, ethical lab practices, and environmental awareness.

📊 CO-PO Mapping Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	2	2	1
CO2	3	3	3	2	2	2
CO3	3	3	3	3	2	2
CO4	3	2	3	3	3	2
CO5	3	3	3	2	2	2
CO6	3	2	3	3	2	1

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6
CO7	3	2	2	2	3	3

🗀 Legend (for CO-PO Mapping Matrix)

Level	Meaning
3	Strongly related
2	Moderately related
1	Low relevance
0	Not related or negligible

SEMESTER VI

Zoo - 601: Study of Leech and Calotes

Programme Outcomes (POs), Course Outcomes (COs) and CO-PO Mapping Matrix

✴ Programme Outcomes (POs)

1. **PO1:** Understanding of animal diversity and biological systems.
2. **PO2:** Skill development in dissection, observation, and identification.
3. **PO3:** Promote environmental and wildlife conservation awareness.

4. **PO4:** Enhance scientific writing and communication.

✳ Course Outcomes (COs)

1. **CO1:** Understand morphology and anatomy of leech and Calotes.
2. **CO2:** Comprehend biological systems like digestion, respiration, and reproduction.
3. **CO3:** Identify and explain nervous and sensory structures.
4. **CO4:** Demonstrate dissection skills and label diagrams.

✳ CO-PO Mapping Matrix

CO / PO	PO1	PO2	PO3	PO4
CO1	3	2	2	1
CO2	3	3	2	1
CO3	2	3	2	1
CO4	1	3	1	2

Legend:

- 3 = Strongly related
- 2 = Moderately related
- 1 = Slightly related

- 0 = Not related

Zoo - 602: Chick Embryology

Course Outcomes (COs)

By the end of this course, the student will be able to:

CO1: Explain the basic concepts, scope, and significance of embryology with reference to chick development.
CO2: Describe the processes of spermatogenesis and oogenesis and their role in reproduction.
CO3: Explain the mechanisms of fertilization and the structure of the hen's egg.
CO4: Illustrate and describe cleavage patterns, blastulation, and gastrulation in the chick embryo.
CO5: Identify and explain the sequential developmental stages of chick embryos (18 h, 24 h, 33 h, 48 h, 72 h) with morphological features.
CO6: Describe the structure and functions of extra-embryonic membranes (yolk sac, amnion, chorion, allantois) and their significance in embryonic development

CO–PO Mapping Matrix

COs	PO1: Knowledge of Life Sciences	PO2: Problem Analysis	PO3: Investigation of Complex Problems	PO4: Conduct of Lab/Field Studies	PO5: Modern Tool Usage	PO6: Communication Skills	PO7: Life-long Learning
CO1	3	1	1	0	0	2	2
CO2	3	2	2	1	0	1	2
CO3	3	2	2	1	0	1	2
CO4	3	2	3	2	1	2	3
CO5	3	2	3	3	2	2	3
CO6	3	2	2	2	1	2	3

Legend for CO–PO Mapping

- **PO1** – Knowledge of Life Sciences: Understanding core biological concepts and principles.
- **PO2** – Problem Analysis: Identifying, formulating, and analyzing biological problems.

- **PO3** – Investigation of Complex Problems: Using research-based knowledge for analysis.
- **PO4** – Conduct of Lab/Field Studies: Applying experimental skills for biological studies.
- **PO5** – Modern Tool Usage: Using modern scientific tools and software.
- **PO6** – Communication Skills: Presenting scientific information effectively.
- **PO7** – Life-long Learning: Independent learning for continuous knowledge improvement.

Mapping Scale:

- **3** – High correlation
- **2** – Moderate correlation
- **1** – Low correlation
- **0** – No correlation

Zoo - 603: Applied Zoology

Course Outcomes (COs)

By the end of this course, students will be able to:

CO1: Explain the scope of applied zoology with emphasis on vermiculture and poultry farming.
CO2: Identify characteristics and economically important species of earthworms used in vermicomposting.
CO3: Demonstrate methods of vermicomposting, vermiwash production, and explain their role in waste management and soil enrichment.
CO4: Describe the systematic position, habits, habitat, and morphology of the Indian fowl (*Gallus gallus domesticus*).
CO5: Identify and differentiate various poultry breeds and explain their origin, characters, and utility.
CO6: Explain brooding, rearing, housing, nutrition, and equipment requirements for poultry farming.
CO7: Recognize symptoms, causes, and control measures of major poultry diseases (viral, bacterial, fungal, parasitic, protozoal).
CO8: Evaluate the economics of poultry production, nutritive value of eggs, importance of poultry manure, and marketing strategies.

CO–PO Mapping Matrix

COs	PO1 Knowledge of Life Sciences	PO2 Problem Analysis	PO3 Investigation of Complex Problems	PO4 Conduct of Lab/Field Studies	PO5 Modern Tool Usage	PO6 Communication Skills	PO7 Life-long Learning
CO1	3	2	1	1	0	2	2
CO2	3	2	2	2	0	1	2
CO3	3	3	3	3	1	2	3
CO4	3	1	1	1	0	1	2
CO5	3	2	2	2	1	2	3
CO6	3	2	2	3	1	2	3
CO7	3	3	3	3	1	2	3
CO8	3	3	2	2	0	3	3

Legend for CO–PO Mapping

- **PO1 – Knowledge of Life Sciences:** Understanding and application of zoological concepts in real-life situations.
- **PO2 – Problem Analysis:** Ability to identify, analyze, and solve problems in vermiculture and poultry farming.
- **PO3 – Investigation of Complex Problems:** Research and study-based understanding of advanced zoological processes.
- **PO4 – Conduct of Lab/Field Studies:** Skills to perform experiments, field studies, and practical applications.
- **PO5 – Modern Tool Usage:** Use of modern farming tools, equipment, and technology in applied zoology.
- **PO6 – Communication Skills:** Ability to present scientific information effectively.
- **PO7 – Life-long Learning:** Continuous learning and adaptation in zoological applications.

Mapping Scale:

- **3** – High correlation
- **2** – Moderate correlation
- **1** – Low correlation
- **0** – No correlation

Zoo - 604: Microtechnique

Course Outcomes (COs)

By the end of this course, students will be able to:

CO1: Explain the scope, applications, and importance of microtechnique in biological studies.
CO2: Identify appropriate methods for collection, preparation, and fixation of specimens for microscopic study.
CO3: Apply techniques of washing, dehydration, and clearing using suitable chemical agents.
CO4: Demonstrate embedding, block making, trimming, and mounting procedures for tissue sections.
CO5: Operate and maintain microtomes, handle knives, and troubleshoot section cutting defects.
CO6: Apply staining methods (acidic, basic, neutral, vital stains, double staining, and special stains) and prepare permanent slides.
CO7: Use mounting media, preserve slides, and employ tools like the camera lucida and micrometer scale for histological studies.

CO–PO Mapping Matrix

COs	PO1 Knowledge of Life Sciences	PO2 Problem Analysis	PO3 Investigation of Complex Problems	PO4 Conduct of Lab/Field Studies	PO5 Modern Tool Usage	PO6 Communication Skills	PO7 Life-long Learning
CO1	3	1	1	0	0	2	2
CO2	3	2	2	2	1	1	2
CO3	3	2	2	3	1	1	3
CO4	3	2	3	3	2	2	3
CO5	3	2	3	3	3	2	3
CO6	3	2	3	3	2	2	3
CO7	3	2	2	2	2	2	3

Legend for CO–PO Mapping

- **PO1 – Knowledge of Life Sciences:** Understanding biological principles in tissue preparation and microscopy.
- **PO2 – Problem Analysis:** Identifying and solving issues in tissue processing and microtechnique procedures.
- **PO3 – Investigation of Complex Problems:** Applying scientific knowledge to optimize specimen preparation and analysis.
- **PO4 – Conduct of Lab/Field Studies:** Performing and managing laboratory microtechnique operations effectively.
- **PO5 – Modern Tool Usage:** Operating and maintaining modern histological and microscopic instruments.
- **PO6 – Communication Skills:** Documenting and presenting scientific observations effectively.
- **PO7 – Life-long Learning:** Adapting to new techniques and innovations in microscopy and histology.

Mapping Scale:

- **3** – High correlation
- **2** – Moderate correlation
- **1** – Low correlation
- **0** – No correlation

Zoo - 605: Research Methodology

Course Outcomes (COs)

By the end of this course, students will be able to:

CO1: Explain the fundamental concepts, objectives, and types of research in life sciences.
CO2: Design an appropriate research plan, including problem identification, hypothesis formulation, and experimental design.
CO3: Apply suitable methods for data collection, processing, statistical analysis, and result interpretation.
CO4: Create and present data using charts, graphs, and MS Excel tools effectively.
CO5: Write scientific reports, dissertations, theses, and research papers following proper structure and format.
CO6: Understand and apply ethical principles in research, including intellectual property rights, plagiarism avoidance, and proper citation practices.

CO–PO Mapping Matrix

COs	PO1 Knowledge of Life Sciences	PO2 Problem Analysis	PO3 Investigation of Complex Problems	PO4 Conduct of Lab/Field Studies	PO5 Modern Tool Usage	PO6 Communication Skills	PO7 Life-long Learning
CO1	3	2	1	0	0	2	2
CO2	3	3	3	2	1	2	3
CO3	3	3	3	3	2	2	3
CO4	2	2	2	2	3	2	3
CO5	2	2	2	1	1	3	3
CO6	3	2	2	0	1	3	3

Legend for CO–PO Mapping

- **PO1 – Knowledge of Life Sciences:** Understanding of research fundamentals and their applications in biological sciences.
- **PO2 – Problem Analysis:** Ability to define research problems, analyze needs, and formulate objectives.
- **PO3 – Investigation of Complex Problems:** Applying research methods and statistical tools for complex scientific inquiries.
- **PO4 – Conduct of Lab/Field Studies:** Designing and conducting experiments and surveys effectively.
- **PO5 – Modern Tool Usage:** Use of statistical software, MS Excel, and other modern tools in research.
- **PO6 – Communication Skills:** Writing, presenting, and publishing scientific work effectively.
- **PO7 – Life-long Learning:** Adapting to new research methodologies and advancements.

Mapping Scale:

- **3** – High correlation
- **2** – Moderate correlation
- **1** – Low correlation
- **0** – No correlation

DSC ELELCTIVE COURSE (Any one from 606 A or 606 B)

Zoo – 606 (B) Sericulture

Course Outcomes (COs)

By the end of this course, students will be able to:

CO1: Explain the history, scope, and present status of sericulture and identify major silk-producing centres.
CO2: Classify different types of silkworms and describe their distribution.
CO3: Describe the biology, life cycle, and morphology of *Bombyx mori*, including silk gland structure and function.
CO4: Apply scientific methods for mulberry cultivation, including selection of variety, propagation, soil and climate requirements, and harvesting techniques.
CO5: Demonstrate silkworm rearing techniques, environmental requirements, and post-harvest processing of cocoons.
CO6: Identify and describe silkworm diseases and pests, and implement preventive and control measures.

CO–PO Mapping Matrix

COs	PO1 Knowledge of Life Sciences	PO2 Problem Analysis	PO3 Investigation of Complex Problems	PO4 Conduct of Lab/Field Studies	PO5 Modern Tool Usage	PO6 Communication Skills	PO7 Life-long Learning
CO1	3	1	1	0	0	2	2
CO2	3	1	1	0	0	1	2
CO3	3	2	2	2	1	1	3

COs	PO1 Knowledge of Life Sciences	PO2 Problem Analysis	PO3 Investigation of Complex Problems	PO4 Conduct of Lab/Field Studies	PO5 Modern Tool Usage	PO6 Communication Skills	PO7 Life-long Learning
CO4	3	3	3	3	2	2	3
CO5	3	3	3	3	2	2	3
CO6	3	3	2	2	1	2	3

Legend for CO–PO Mapping

- **PO1 – Knowledge of Life Sciences:** Understanding sericulture principles, silk production biology, and pest/disease management.
- **PO2 – Problem Analysis:** Identifying challenges in silkworm rearing, mulberry cultivation, and pest control.
- **PO3 – Investigation of Complex Problems:** Applying biological and agricultural knowledge to improve silk yield and quality.
- **PO4 – Conduct of Lab/Field Studies:** Hands-on practices in rearing techniques, mulberry farming, and cocoon processing.
- **PO5 – Modern Tool Usage:** Use of rearing appliances, pest control tools, and farming equipment.
- **PO6 – Communication Skills:** Documenting sericulture practices and effectively conveying technical information.
- **PO7 – Life-long Learning:** Adapting to new techniques in silk production and sericulture entrepreneurship.

Mapping Scale:

- **3** – High correlation
- **2** – Moderate correlation
- **1** – Low correlation
- **0** – No correlation

Zoo - 607: Corresponding practical to DSC Zoo 601

Course Outcomes (COs)

After completion of this practical course, students will be able to:

CO1: Identify the **systematic position**, habit, and habitat of *Leech* and *Calotes*.
CO2: Describe the **structural and functional details** of external characters, digestive system, nervous system, and reproductive system of *Leech*.
CO3: Describe the **structural and functional details** of external characters, digestive system, nervous system, and reproductive system of *Calotes*.
CO4: Compare the **structural and functional adaptations** of invertebrates (*Leech*) and vertebrates (*Calotes*).
CO5: Interpret diagrams and charts to **understand morphological and anatomical details** of studied specimens.

Program Outcomes (POs) Legend

PO Code	Program Outcomes
PO1	Knowledge of zoological concepts, principles, and taxonomy.
PO2	Laboratory skills in biological analysis, dissection, and specimen handling.
PO3	Ability to observe, identify, and classify organisms accurately.
PO4	Understanding structure–function relationships in animals.
PO5	Analytical, comparative, and interpretive skills in zoology.
PO6	Communication of zoological knowledge through diagrams, charts, and reports.
PO7	Application of zoological knowledge in research, education, and biodiversity conservation.

CO–PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	1
CO2	3	3	2	3	2	2	1
CO3	3	3	2	3	2	2	1
CO4	3	2	2	3	3	2	2
CO5	2	2	3	2	2	3	1

Legend for Mapping Strength:
3 – High correlation
2 – Medium correlation
1 – Low correlation

Zoo - 608: Corresponding practical to DSC Zoo 602 and Zoo 603

Course Outcomes (COs)

After completion of this course, the student will be able to:

CO1 – Demonstrate practical skills in vermicomposting, vermiculturing, and poultry farming techniques.
CO2 – Identify and describe developmental stages of chick embryos using permanent slides, charts, and models.
CO3 – Establish and manage vermicompost and vermiwash units for bio-compost production.
CO4 – Rear and manage poultry for production and identify breeds, equipment, and farm management practices.
CO5 – Apply knowledge of embryology, vermiculture, and poultry farming for self-employment or allied industry jobs.

CO–PO Mapping Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	2	3	2	1	2	2	1	2
CO2	3	2	3	2	2	3	1	1	1	2	1	2
CO3	3	2	3	3	3	3	3	2	3	2	2	3
CO4	3	2	3	3	3	3	2	2	3	3	2	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3

Legend

POs refer to the **Program Outcomes** as per standard **UG Zoology** framework:

- **PO1** – Knowledge of zoological concepts and principles
- **PO2** – Understanding of applied zoology and life sciences
- **PO3** – Practical skills in laboratory and field studies
- **PO4** – Problem analysis and critical thinking
- **PO5** – Modern tool usage and handling of equipment
- **PO6** – Project management and teamwork skills
- **PO7** – Environmental and sustainability awareness
- **PO8** – Ethics and professional responsibility
- **PO9** – Communication skills
- **PO10** – Individual and lifelong learning skills
- **PO11** – Entrepreneurship and employment readiness
- **PO12** – Application of knowledge for societal benefit

Rating Scale:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Slight correlation
- **Blank** = No correlation

Zoo - 609: Corresponding practical to DSC Zoo 604

Course Outcomes (COs)

By the end of this course, students will be able to:

CO1: Prepare permanent whole mounts of various specimens and histological sections from mammalian tissues.
CO2: Demonstrate the use of Rotary and Rocking microtomes for section cutting.
CO3: Perform vital staining techniques such as Janus Green B staining for mitochondria.
CO4: Calibrate a micrometer scale to measure cell diameter from permanent slides.
CO5: Create accurate biological sketches using camera lucida.
CO6: Submit scientifically prepared slides as part of practical skill development.

CO–PO Mapping Matrix

Legend:

- **PO1:** Knowledge of biology and zoology fundamentals.
- **PO2:** Laboratory skills and practical competence.
- **PO3:** Data collection, analysis, and interpretation.
- **PO4:** Use of modern tools and techniques in biological studies.
- **PO5:** Communication skills, including documentation and presentation.
- **PO6:** Professional ethics and responsibility in biological sciences.
- **PO7:** Lifelong learning and adaptability in biological sciences.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	1	1	2
CO2	2	3	2	3	1	1	2

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO3	2	3	2	3	1	2	2
CO4	2	3	3	3	1	1	2
CO5	1	2	2	1	3	1	2
CO6	2	3	2	2	2	2	3

Scale:

3 – Strongly aligned

2 – Moderately aligned

1 – Slightly aligne

F.Y.BSc. Chemistry - CH: 101 Physical and Inorganic Chemistry - I (Semester I)

June 2018-19 to 2021-22

✅Step 1: Define Course Outcomes (COs)

Upon successful completion of this course, students will be able to:

CO1- Understand and apply the concepts of electrolytic conductance to determine conductance, equivalent conductance, and the degree of ionization, and solve problems related to conductometric titrations and solubility.

CO2- Explore surface chemistry concepts, including adsorption mechanisms, types of adsorption, adsorption isotherms (Freundlich and Langmuir), and their applications in various chemical processes.

CO3- Develop mathematical skills in chemistry by mastering logarithms, graphing techniques, differentiation, and integration, particularly in the context of chemical calculations.

CO4- Study periodic properties of elements, including atomic and ionic sizes, ionization energy, electron affinity, electronegativity, and their trends across periods and groups, to understand the chemical behavior of elements.

CO5- Learn the characteristics and chemistry of S-block elements, including their electronic configurations, periodic trends, and complex formation, with a focus on the formation of complexes and their properties.

✅Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1- Apply theoretical concepts in physical and inorganic chemistry to solve complex chemical problems.

PO2- Develop critical thinking and problem-solving skills in the analysis and interpretation of experimental data.

PO3- Enhance quantitative and qualitative analysis skills, both in theoretical calculations and experimental procedures.

PO4- Understand the fundamentals of chemistry and its application to real-world problems and industrial processes.

PO5- Communicate scientific knowledge effectively, in both written and oral forms, using appropriate technical language and methods.

✅Step 3: CO-PO Correlation Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1 (Electrolytic Conductance)	3	3	2	2	1
CO2 (Surface Chemistry)	2	3	2	3	2

CO/PO	PO1	PO2	PO3	PO4	PO5
CO3 (Mathematical Preparation)	3	2	3	1	2
CO4 (Periodic Properties)	3	3	2	2	3
CO5 (S-block Elements)	3	2	3	2	2

✅Step 4: Interpretation of CO-PO Mapping

- **CO1 (Electrolytic Conductance)**: The understanding of electrolytic conductance and related calculations is essential for applying theory to solve chemical problems (PO1). It requires data interpretation skills (PO2) and application of mathematical methods, but has less relevance for communication (PO5).
- **CO2 (Surface Chemistry)**: The concepts of adsorption and isotherms directly connect to problem-solving and data analysis (PO1 and PO2) and can be applied to real-world scenarios (PO4). Communication skills (PO5) are moderately involved, especially when explaining complex concepts.
- **CO3 (Mathematical Preparation)**: Mastery of mathematical concepts like logarithms, differentiation, and integration is foundational for all chemical calculations (PO1, PO2, PO3). However, it requires less emphasis on communication (PO5) and practical application (PO4).
- **CO4 (Periodic Properties)**: Understanding periodic properties and trends is essential for analyzing and interpreting chemical behaviors (PO1 and PO2), and this knowledge is crucial for both problem-solving and applying the concepts to new situations (PO3 and PO4). The communication of this knowledge is also key (PO5).
- **CO5 (S-block Elements)**: The study of S-block elements and their complexes links theoretical knowledge to chemical behavior and properties (PO1 and PO3), while also requiring some

problem-solving and quantitative analysis (PO2). Communication (PO5) is relevant for explaining these concepts in an academic or industrial context.

F.Y.BSc. Chemistry - CH: 201 Physical and Inorganic Chemistry - II (Semester II)

June 2018-19 to 2021-22

✅Step 1: Define Course Outcomes (COs)

Upon successful completion of this course, students will be able to:

- **CO1- Understand and apply the kinetic theory of gases** to explain the behavior of ideal and real gases, including deviations from ideal behavior and the application of Van der Waals' equation and Joule-Thomson effect.
- **CO2- Analyze the properties of the liquid state**, including surface tension and viscosity, and perform experimental measurements using techniques such as capillary rise and stalagmometer methods.
- **CO3- Explain the second law of thermodynamics** and apply the concept of entropy to various physical and chemical processes, ideal gases and entropy changes.
- **CO4- Study the metallurgy of metals**, understanding the steps in the extraction and refining of metals, concentration of ores, calcination, roasting, and hydrometallurgy.
- **CO5- Examine the properties and trends of P-block elements**, including their electronic configurations, variations in atomic radius, ionization energy, electronegativity, and reactivity. Learn bonding and shapes of P-block molecules.

✅Step 2: Identify Relevant Pos (Program Outcomes)

By the end of this program, students will be able to:

- ✓ **PO1- Apply theoretical concepts in physical and inorganic chemistry** to solve complex chemical problems.
- ✓ **PO2- Develop critical thinking and problem-solving skills** in analyzing chemical reactions and experimental results.
- ✓ **PO3- Demonstrate quantitative and qualitative analytical skills**, with an emphasis on precision and accuracy in experimental work.
- ✓ **PO4- Relate chemical principles to industrial and real-world applications**, understanding the significance of chemistry in various technologies and processes.
- ✓ **PO5- Effectively communicate scientific ideas**, both verbally and in written formats, using appropriate chemical terminology.

✅Step 3: CO-PO Correlation Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1 (Kinetic Theory of Gases)	3	3	2	2	1
CO2 (Liquid State)	2	3	3	2	2
CO3 (Second Law of Thermodynamics)	3	3	2	1	2
CO4 (Metals and Metallurgy)	2	3	3	3	2
CO5 (P-Block Elements)	3	3	2	2	3

✅Step 4: Interpretation of CO-PO Mapping

- **CO1 (Kinetic Theory of Gases)**: The focus here is on understanding and applying the kinetic theory of gases, which requires solid problem-solving skills (PO1 and PO2) and some basic communication (PO5) when explaining these concepts.
- **CO2 (Liquid State)**: This involves experimental and theoretical work on surface tension and viscosity, necessitating quantitative analysis skills (PO3) and problem-solving abilities (PO2), with significant real-world applications (PO4) in understanding the behavior of liquids.
- **CO3 (Second Law of Thermodynamics)**: The second law and entropy changes involve deep understanding and problem-solving, especially in applying these concepts to chemical processes (PO1 and PO2). Some focus on communication (PO5) is needed for discussing entropy changes, but real-world applications (PO4) are moderately emphasized.
- **CO4 (Metals and Metallurgy)**: This chapter connects well to industrial applications (PO4) and requires practical problem-solving skills in understanding the extraction and refining processes of metals (PO2). Students will also need to demonstrate strong communication skills (PO5) to explain processes in a clear and structured manner.
- **CO5 (P-Block Elements)**: The study of P-block elements and their trends in properties is central to understanding periodicity and bonding, requiring strong theoretical knowledge (PO1) and the ability to explain and apply these trends to real-world chemical behavior (PO2 and PO4).

F.Y.BSc. Chemistry - CH: 101 Physical and Inorganic Chemistry

Sem I, June 2022-23 to 2023-24

✅Step 1: Define Course Outcomes (COs)

Upon successful completion of this course, students will be able to:

1. **Understand atomic structure** by studying various atomic models, quantum mechanics, and the significance of quantum numbers.
2. **Apply mathematical techniques** (logarithms, differentiation, and integration) in solving chemical problems, especially in pH calculations and graphical representation of data.
3. **Analyze the gaseous state** through the kinetic theory of gases, understanding deviations from ideal behavior, and the behavior of real gases using the Van der Waals equation.
4. **Comprehend the periodic properties** of elements, including atomic and ionic size, ionization energy, electron affinity, and electronegativity, and correlate these properties with chemical behavior.
5. **Understand the structure of atoms** and the classification of elements using the modern periodic law and periodic table.

✅Step 2: Identify Relevant Pos (Program Outcomes)

By the end of this program, students will be able to:

- **Apply theoretical concepts in physical chemistry** to solve real-world problems in chemistry.
- **Demonstrate analytical skills** by using mathematical tools and chemical principles to interpret experimental data.
- **Engage in scientific reasoning and problem-solving** to understand molecular and atomic behavior.
- **Enhance experimental and theoretical understanding** of chemical processes through collaboration and independent study.

✅Step 3: CO-PO Correlation Matrix

CO/PO	PO1	PO2	PO3	PO4
CO1	3	2	3	1
CO2	2	3	2	2
CO3	3	2	3	2
CO4	3	2	3	2
CO5	3	3	2	2

✅Step 4: Interpretation of CO-PO Mapping

- **CO1 (Atomic Structure)**: This is highly relevant to PO1 (application of theoretical knowledge) and PO3 (understanding molecular behavior), but has less relevance to teamwork and collaboration.
- **CO2 (Mathematical Preparation)**: The skills learned here are more relevant to PO2 (problem-solving and analysis), enhancing the student's ability to solve real-world chemical problems and interpret data.
- **CO3 (Gaseous State)**: Understanding the behavior of gases is crucial for real-world applications (PO1) and enhances scientific reasoning (PO3), as well as collaboration in experimental settings (PO4).
- **CO4 (Periodic Properties)**: This CO builds on understanding periodic trends and how they relate to chemical behavior, which is fundamental to the application of theory (PO1) and problem-solving (PO2).

- **CO5 (Atomic Structure - Part II and Periodicity)**: This CO involves core concepts related to atomic structure and periodic trends, aligning strongly with PO1 and PO2 for theoretical and analytical applications.

F.Y.BSc. Chemistry - CH: 201 Physical and Inorganic Chemistry

(Semester II), June 2022-23 to 2023-24

✅Step 1: Define Course Outcomes (COs)

Upon successful completion of this course, students will be able to:

1. **Understand the liquid state** by studying surface tension, viscosity, and the factors affecting these properties, as well as methods of measurement.
2. **Comprehend chemical equilibrium** concepts, including the law of mass action, Le Chatelier's principle, and calculations involving equilibrium constants.
3. **Apply the second and third laws of thermodynamics** to chemical processes, understanding entropy, spontaneity, and the implications of these principles on physical and chemical changes.
4. **Understand the principles of inorganic qualitative analysis**, including the role of different reagents, solubility product, and common ion effect in the systematic separation and detection of ions.
5. **Study ionic equilibria**, focusing on strong and weak acids and bases, dissociation constants, pH, pOH, and buffer solutions, and their applications.

✅Step 2: Identify Relevant Pos (Program Outcomes)

By the end of this program, students will be able to:

1. **Apply theoretical concepts in physical and inorganic chemistry** to solve practical problems.
2. **Demonstrate analytical skills** by solving chemical problems and interpreting experimental data.
3. **Enhance experimental and theoretical understanding** of various chemical processes through collaboration and independent study.
4. **Develop critical thinking and problem-solving skills** in the context of physical chemistry and inorganic analysis.
5. **Communicate scientific knowledge effectively**, both in written and oral forms, based on the understanding of chemical phenomena.

✅Step 3: CO-PO Correlation Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	1	2
CO2	3	3	2	2	3
CO3	3	3	3	2	2
CO4	3	2	2	3	2
CO5	3	3	2	2	3

✅Step 4: Interpretation of CO-PO Mapping

- **CO1 (Liquid State)**: The study of surface tension and viscosity is foundational for physical chemistry, impacting PO1 (application of theory), PO2 (data interpretation), and PO3 (scientific reasoning). It is less relevant to communication (PO5) and collaboration (PO4).

- **CO2 (Chemical Equilibrium)**: The understanding of equilibrium concepts is crucial for solving chemical problems (PO1) and is highly relevant for data interpretation (PO2). It also involves communication skills for explaining industrial processes (PO5).

- **CO3 (Thermodynamics)**: Thermodynamic principles are highly applicable (PO1) and crucial for experimental data interpretation (PO2). Understanding entropy and spontaneity contributes significantly to critical thinking and problem-solving (PO3).

- **CO4 (Qualitative Analysis)**: Knowledge of inorganic qualitative analysis requires application of theoretical concepts (PO1), data interpretation (PO2), and collaboration (PO4) in laboratory settings, with moderate relevance to communication (PO5).

- **CO5 (Ionic Equilibria)**: The study of ionic equilibria and buffer solutions is fundamental for both theoretical knowledge (PO1) and practical applications (PO2), and enhances collaboration and communication in laboratory settings (PO4 and PO5).

F.Y.BSc. Chemistry Course (CH-111: Fundamentals of Chemistry-I)

NEP 2020 Sem I, 2024-25

Here is the Course Outcome (CO) and Program Outcome (PO) Correlation Table for the F.Y.BSc. Chemistry Course (CH-111: Fundamentals of Chemistry-I) NEP 2020 Sem I is given. This shows how each CO contributes to different POs.

✅**Step 1: Define Course Outcomes (COs)**

CO1: Understand and explain intermolecular forces, surface tension, and viscosity with methods to measure them.

CO2: Analyze trends in periodic properties and correlate them with chemical behavior of elements.

CO3: Demonstrate an understanding of organic bonding, aromaticity, structural effects, and their relevance to reactivity and acidity/basicity.

CO4: Identify, name, and differentiate alkanes, alkenes, and alkynes with understanding of hybridization, preparation, and reaction mechanisms.

CO5: Perform basic calculations and reasoning based on numerical problems related to viscosity, surface tension, periodic properties and hybridization.

CO6: Apply knowledge of structural effects and reactive intermediates to understand organic reaction mechanisms.

✅**Step 2: Identify Relevant POs**

- **PO1**: Fundamental chemistry knowledge (theory and concepts)
- **PO2**: Hands-on skills and experimental practices
- **PO3**: Understanding of trends in the periodic table
- **PO4**: Ability to identify, name, and draw organic compounds

- **PO5**: Mechanistic and logical analysis of organic reactions
- **PO6**: Connecting chemistry knowledge to practical and real-life applications

✅ **Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)**

- **Grade Key:** **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	1	1	1	2
CO2	3	1	3	2	2	2
CO3	3	1	1	3	3	2
CO4	3	2	1	3	3	2
CO5	2	3	2	1	2	2
CO6	3	2	1	2	3	3

✅ **Step 4: Interpretation of CO-PO Mapping**

1. **CO1 – Liquid Properties (Surface Tension & Viscosity):**
   - Strongly contributes to **basic chemical knowledge (PO1)** and **lab skills (PO2)** due to practical methods like **capillary rise and Ostwald's method**.
2. **CO2 – Periodic Properties:**
   - Strong alignment with **PO3 (Periodic Understanding)**—a core concept.
   - Moderate contribution to **PO4 (Structure) & PO5 (Reactivity)**, as periodicity helps predict trends in bonding and chemical reactions.
3. **CO3 – Organic Bonding, Aromaticity & Structural Effects:**
   - Highly supports **PO1, PO4, PO5**, providing the **theoretical base** for organic chemistry and influencing reaction behavior.
4. **CO4 – Hydrocarbons:**

- Strong impact on **PO4 (Structure/Nomenclature)** and **PO5 (Mechanism)** by explaining **preparation, hybridization, and reaction** mechanisms.

5. **CO5 – Numerical Problem Solving:**
   - Supports **PO2 (Lab/Analytical Skills)** and **PO3**, involving **calculations and applications** of physical and organic chemistry problems.
   - Boosts **analytical thinking** and quantitative reasoning needed in chemistry.
6. **CO6 – Reaction Mechanism & Reactive Intermediates:**
   - Strongly supports **PO5**, essential for understanding **how and why reactions occur**.
   - Promotes a deeper conceptual link to organic chemistry and real-life applications (e.g., pharmaceuticals, synthesis).

F.Y.BSc. Chemistry Course (CH-121: Fundamentals of Chemistry-II

NEP 2020, Sem- II 2024-25

✅Step 1: Define Course Outcomes (COs)

After successful completion of this course, the student will be able to:

CO1: Understand and apply the kinetic theory of gases, compressibility factor, and real gas behavior using Van der Waal's equation and other theoretical concepts.

CO2: Explain different types of chemical bonds, overlaps, and theories such as VBT and the VSEPR theory to predict the structure and geometry of molecules.

CO3: Classify haloalkane and haloarenes; understand their nomenclature, methods of preparation, and chemical reactions including nucleophilic substitution.

CO4: Understand and classify alcohols, phenols, and ethers; learn their nomenclature, preparation methods, physical properties, and important chemical reactions.

✅Step 2: Identify Relevant Pos

By the end of the B.Sc. Chemistry program, students will be able to:

PO1: Demonstrate knowledge of fundamental principles and concepts of Chemistry.

PO2: Analyze and solve chemical problems using theoretical and practical understanding.

PO3: Perform and interpret chemical experiments using appropriate techniques and instrumentation.

PO4: Relate chemistry concepts to industrial, environmental, and everyday applications.

PO5: Communicate chemical information effectively through oral, written, and digital means.

✅ Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1 (Gaseous State)	3	3	2	2	1
CO2 (Chemical Bonding)	3	3	1	2	2
CO3 (Haloalkane & Haloarenes)	3	3	2	2	2

Scale: 3 – High | 2 – Medium | 1 – Low | 0 – No correlation

✅ Step 4: Interpretation of the CO-PO Matrix (CO1 to CO3):

- **CO1:** Strongly aligns with **PO1 and PO2** as it builds foundational knowledge of gas laws and real gas behavior. Practical skills (**PO3**) and real-life relevance such as liquefaction processes (**PO4**) are moderately emphasized. Communication of scientific findings is also introduced (**PO5**).
- **CO2:** Core understanding of bonding theories is deeply rooted in theoretical chemistry (**PO1**), with high-level analytical skills required (**PO2**). Though experimental aspects (**PO3**) are limited here, the ability to relate structural understanding to molecular geometry (**PO4**) and clearly explain molecular shapes (**PO5**) is moderately important.
- **CO3:** Involves both theoretical and practical aspects of organic chemistry. Strong understanding of structure, nomenclature, and mechanisms enhances both **PO1** and **PO2**. The

reaction mechanisms require **PO3** level skills and relate to real-world applications in pharmaceuticals and materials (**PO4**). Communication is relevant for writing mechanisms and reaction pathways (**PO5**).

T.Y.BSc. Chemistry syllabus from **Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon**,
CH-501: Principles of Physical Chemistry-I
June 2020-21 to 2024-25

✅Step 1: Define Course Outcomes (COs)

CO Code	Course Outcome Description
CO1	Understand the fundamental principles of quantum chemistry and interpret wave functions.
CO2	Analyze and derive kinetic equations for chemical reactions and understand reaction mechanisms.
CO3	Interpret phase diagrams and apply phase rule for one and two-component systems.
CO4	Understand electrochemical cells, EMF concepts, and applications like pH measurement.

✅Step 2: Identify Relevant POs

PO Code	Program Outcome Description
PO1	Gain foundational and advanced knowledge of core areas in chemistry (Physical, Organic, Inorganic, Analytical, Industrial and Spectroscopy).
PO2	Develop practical skills for chemical analysis, synthesis, and instrumentation handling.
PO3	Apply chemistry knowledge in industrial and environmental contexts with awareness of sustainable practices.

PO Code	Program Outcome Description
PO4	Solve chemical problems using critical thinking and scientific reasoning.
PO5	Communicate scientific ideas effectively in academic and industrial environments.
PO6	Demonstrate ethical responsibility and safety awareness in laboratory and industrial practices.

✅ **Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)**

✅ **Grade Key:** **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	2	3	2	1
CO2	3	2	2	3	2	2
CO3	3	2	2	3	1	2
CO4	3	3	3	3	2	3

✅ **Step 4: Interpretation of CO-PO Mapping**

- **CO1** is heavily aligned with **PO1** (theoretical chemistry) and **PO4** (scientific reasoning), as students explore quantum mechanical foundations.

- **CO2** through **CO4** demonstrate strong links with **PO2** (lab and calculations), **PO3** (industry relevance, e.g., electrochemistry, phase rule), and **PO6** (lab safety and accuracy in measurements).

- **All COs** emphasizes **PO4** due to the analytical and mathematical problem-solving required.

- **CO4**, in particular, has high relevance across all outcomes, especially **PO2**, **PO3**, and **PO6**, due to its experimental and application-oriented nature.

T.Y.BSc. Chemistry syllabus from **Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon**,

CH-601: Principles of Physical Chemistry-II

June 2020-21 to 2024-25

✅ **Step 1: Define Course Outcomes (COs)**

CO Code	Course Outcome Description
CO1	Analyze rotational spectra and determine bond lengths using molecular spectroscopy.
CO2	Explain nuclear decay processes and apply nuclear chemistry to medical and scientific investigations.
CO3	Describe photochemical reactions and mechanisms involving fluorescence and phosphorescence.
CO4	Interpret and analyze crystal structures using laws of crystallography and diffraction methods.

✅ **Step 2: Identify Relevant Pos (Program Outcomes)**

PO Code	Program Outcome Description
PO1	Gain foundational and advanced knowledge of core areas in chemistry.
PO2	Develop practical skills for chemical analysis and instrumentation handling.
PO3	Apply chemistry knowledge in industrial and environmental contexts.
PO4	Solve chemical problems using critical thinking and scientific reasoning.
PO5	Communicate scientific ideas effectively in academic and industrial environments.

PO6 Demonstrate ethical responsibility and safety awareness in laboratory practices.

✅ **Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	2	1
CO2	3	2	3	3	2	2
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	2

Legend: 3 = High, 2 = Medium, 1 = Low

✅ **Step 4: Interpretation of CO-PO Mapping**

- **CO1** demonstrates a strong relationship with **PO1** and **PO4**, as it emphasizes theoretical understanding and problem-solving using spectroscopy principles. Moderate support for practical handling (PO2).

- **CO2** is well aligned with **PO3**, due to its focus on real-world applications in medicine and energy. It also supports theoretical and ethical learning outcomes (PO1, PO6).

- **CO3** involves the study of photochemical processes, supporting analytical thinking (**PO4**) and moderate relevance to environmental context and lab practice (**PO3, PO6**).

- **CO4** strongly supports **PO1** and **PO4**, as students analyze and interpret crystallographic data. Moderate contribution to practical and communicative outcomes (**PO2, PO5**).

S.Y.BSc, Semester I, CH-301: Physical and Inorganic Chemistry:

June 2019-20 to 2024-25

✅Step 1: Define Course Outcomes (COs)

Upon successful completion of this course, students will be able to:

CO1: Understand the basic concepts of solutions, colligative properties, and the behavior of ideal and non-ideal solutions.

CO2: Apply Raoult's law and understand the limitations in various solution types.

CO3: Evaluate and calculate molecular weights of solutes using colligative properties such as freezing point depression and boiling point elevation.

CO4: Examine the physical properties and trends of d-block elements, including their electronic configuration, oxidation states, and catalytic properties.

✅Step 2: Identify Relevant Pos (Program Outcomes)

By the end of this program, students will be able to:

PO1: Apply theoretical chemistry knowledge to solve practical problems in both laboratory and industrial settings.

PO2: Understand and analyze chemical properties of substances and reactions, particularly focusing on physical and inorganic chemistry.

PO3: Develop research and analytical skills using advanced techniques and methods in chemistry.

PO4: Work effectively in teams while conducting experiments or solving chemical problems, demonstrating critical thinking and problem-solving abilities.

✅Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

CO/PO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	3	2	2	2
CO3	2	2	3	1
CO4	1	3	3	2

✅Step 4: Interpretation of CO-PO Mapping

- **CO1**: Focuses mainly on the understanding of solutions, which is highly relevant to PO1 (theoretical chemistry knowledge), less relevant to PO4 (teamwork).
- **CO2**: Applying Raoult's law and understanding colligative properties has moderate relevance across all PO categories, but particularly to PO1 and PO2.
- **CO3**: This CO emphasizes practical calculations, which align more strongly with PO3 (research and analytical skills) and is relevant to PO2 for problem-solving.
- **CO4**: Understanding the properties of d-block elements is most relevant to PO2 and PO3, as it builds research and problem-solving abilities.

SYBSc, Core Course: CH-401 Physical and Inorganic Chemistry

June 2019-20 to 2024-25

✅Step 1: Define Course Outcomes (COs)

Upon successful completion of this course, students will be able to:

CO1: Understand the principles of electrochemistry, including the concepts of EMF, cell reactions, and standard electrode potentials, and calculate thermodynamic quantities like ΔG, ΔH, and ΔS from EMF data.

CO2: Apply chemical thermodynamics to determine free energy changes, equilibrium conditions, and interpret vapor pressure variations using the Clausius-Clapeyron equation.

CO3: Comprehend the basics of coordination chemistry, including the structure and properties of coordination compounds, their nomenclature, and the different types of ligands.

CO4: Understand the properties of conductors, insulators, and semiconductors, and their applications, especially the difference between intrinsic and extrinsic semiconductors.

✅Step 2: Identify Relevant Pos (Program Outcomes)

By the end of this program, students will be able to:

PO1: Apply theoretical knowledge in physical chemistry and inorganic chemistry to solve practical problems in various chemical processes and reactions.

PO2: Demonstrate problem-solving skills by using thermodynamic concepts, electrochemistry, and coordination chemistry to address complex chemical issues.

PO3: Conduct independent research in areas of electrochemistry, thermodynamics, and materials science, such as semiconductors.

PO4: Collaborate effectively in experimental and theoretical studies, applying scientific reasoning to analyze data and results.

✅**Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)**

CO/PO	PO1	PO2	PO3	PO4
CO1	3	3	1	2
CO2	3	2	2	2
CO3	2	1	3	1
CO4	1	1	2	3

✅**Step 4: Interpretation of CO-PO Mapping**

- **CO1 (Electrochemistry)**: Strong focus on theoretical and practical electrochemistry, which has high relevance to PO1 and PO2. It prepares students for real-world applications, though it has less emphasis on research in inorganic chemistry (PO3).

- **CO2 (Chemical Thermodynamics)**: The focus on free energy changes and equilibrium makes this area highly relevant to PO1. While it's still important for PO3 and PO4, it does not have a major emphasis on coordination chemistry or semiconductor-related applications.

- **CO3 (Coordination Chemistry)**: Focuses on the inorganic aspects and research in coordination compounds. This CO is most aligned with PO3, preparing students for research but is less applicable to teamwork in electrochemical processes.

- **CO4 (Conductors, Insulators, Semiconductors)**: Provides foundational knowledge for understanding materials, especially in technology and semiconductor applications, with a high emphasis on teamwork and collaborative work (PO4).

SYBSc. CH-302 Organic and Inorganic Chemistry
Malak S.A.

Program Outcomes (POs)

These are broad competencies students are expected to attain by the end of the program:

1. PO1: Apply knowledge of basic science, life sciences, and chemistry to solve complex scientific problems.
2. PO2: Develop the ability to design experiments, analyze and interpret data.
3. PO3: Demonstrate proficiency in theoretical and practical aspects of chemistry.
4. PO4: Utilize modern tools and techniques for chemical analysis and molecular modeling.
5. PO5: Communicate effectively and ethically in scientific contexts.
6. PO6: Apply principles of green chemistry, sustainability, and safety in labs and industry.
7. PO7: Develop skills for lifelong learning and interdisciplinary research.

Course Outcomes (COs) for CH-302

CO Code	Course Outcome
CO1	Understand and classify types of isomerism with special focus on stereoisomerism.
CO2	Illustrate organic molecules using projection formulae like Fischer, Newman, and Sawhorse.
CO3	Explain optical activity, enantiomerism, chirality, and assign R/S configuration.
CO4	Describe geometrical isomerism using cis-trans, E/Z, and syn-anti nomenclature systems.
CO5	Analyze conformational isomerism in alkanes (ethane and butane) with energy profiles.
CO6	Explain the stereochemistry and conformations of cyclohexane and its monosubstituted derivatives.
CO7	Understand the synthesis, structure, and reactions of heterocyclic and polycyclic aromatic compounds.

CO Code	Course Outcome
CO8	Explain the nature and behavior of solvents and classify acid-base concepts using various theoretical approaches.

CO-PO Mapping Matrix:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	1	-	2
CO2	2	2	3	3	1	-	1
CO3	3	2	3	2	2	1	2
CO4	2	2	3	2	1	-	1
CO5	3	3	3	2	1	1	2
CO6	3	2	3	3	2	1	2
CO7	3	2	3	3	1	2	2

Legend:

3 = strongly related,

2 = moderately related,

1 = slightly related,

- = Not related

Sem-II

CH-402 Organic and Inorganic Chemistry

Program Outcomes (POs):

These remain consistent with broader chemistry program expectations:

1. **PO1:** Apply knowledge of chemical principles and laboratory techniques to solve real-world chemical problems.
2. **PO2:** Conduct experiments, analyze data, and draw logical conclusions based on scientific evidence.
3. **PO3:** Demonstrate understanding of the structure, reactivity, and mechanisms of organic and inorganic compounds.
4. **PO4:** Use modern instruments and techniques for chemical synthesis and analysis.
5. **PO5:** Communicate scientific knowledge effectively and ethically.
6. **PO6:** Apply environmental and safety considerations in chemical practices.
7. **PO7:** Foster a habit of independent learning, inquiry, and interdisciplinary understanding.

Course Outcomes (COs) for CH-402

CO Code	Course Outcome
CO1	Understand the concept of active methylene groups and synthesis routes using acetoacetic ester and malonic ester.
CO2	Describe preparation and synthetic applications of organolithium and organomagnesium (Grignard) compounds.
CO3	Discuss the structure, preparation, and reactivity of organocopper and organozinc reagents**.**
CO4	Apply knowledge of organometallic reagents to the synthesis of organic compounds like alcohols, ketones, acids, and cyclopropanes.
CO5	Explain the LCAO method, molecular orbital combinations, and bonding theories.
CO6	Apply MOT to homonuclear and heteronuclear diatomic molecules to explain bonding and magnetic properties**.**

CO-PO Mapping Matrix:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	1	1	2
CO2	3	2	3	3	2	2	2
CO3	3	2	3	3	2	2	2
CO4	3	3	3	3	2	2	3
CO5	3	2	3	2	1	1	2
CO6	3	3	3	2	2	1	2

Legend:

3 = strongly related,

2 = moderately related,

1 = slightly related,

- = Not related

TYBSc. CH-503 Organic Reaction Mechanism
Malak S.A.

Program Outcomes (POs)

PO1: Understand core concepts in chemistry and their applications in different branches of science.

PO2: Perform laboratory techniques and chemical reactions with scientific reasoning and safety awareness.

PO3: Analyze and interpret chemical reactions using theoretical and mechanistic approaches.

PO4: Communicate scientific knowledge effectively through written and verbal formats.

PO5: Utilize knowledge in designing chemical syntheses and reaction mechanisms.

PO6: Incorporate critical thinking and problem-solving in organic chemistry and its applications.

PO7: Engage in continuous learning and apply modern tools for chemical research and industry.

Course Outcomes (COs) for CH-503

CO Code	Course Outcome
CO1	Explain SN1, SN2, and SNi mechanisms with emphasis on stereochemistry, factors affecting the reaction rate, and special systems like norbornyl.
CO2	Understand electrophilic addition to alkenes with mechanisms, regioselectivity, and stereochemistry including Markownikoff/Anti-Markownikoff rules.
CO3	Describe the structure and reactivity of carbonyl compounds and explain nucleophilic additions and named reactions such as Aldol, Cannizzaro, and Wittig.
CO4	Analyze electrophilic aromatic substitution reactions with mechanistic insights, substituent effects, and examples like nitration, sulfonation, and Friedel–Crafts reactions.
CO5	Understand nucleophilic aromatic substitution mechanisms including SNAr, Benzyne, and Chichibabin reactions with supporting evidences.

CO-PO Mapping Matrix:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	3	3	2
CO2	3	2	3	2	3	3	2
CO3	3	2	3	2	3	3	2
CO4	3	2	3	2	3	3	2

CO5	3	2	3	2	3	3	2

Legend:

3 = strongly related,

2 = moderately related,

1 = slightly related,

- = Not related

Sem-II

CH-603 Spectroscopic Methods of Structure Determination

Program Outcomes (POs):

These remain consistent with broader chemistry program expectations:

1. **PO1:** Acquire comprehensive knowledge of core areas in Chemistry including analytical, organic, inorganic, and physical chemistry.
2. **PO2:** Apply chemical principles to analyze and interpret data from laboratory experiments and spectroscopy.
3. **PO3:** Demonstrate the ability to solve complex problems using theoretical and practical approaches.
4. **PO4:** Communicate chemical information effectively through presentations, reports, and discussions.
5. **PO5:** Use scientific tools and instruments like spectrometers for chemical analysis and research.
6. **PO6:** Engage in independent learning for personal and professional development in the field of chemistry.
7. **PO7:** Understand environmental, ethical, and safety aspects related to chemical substances and their uses.

Course Outcomes (COs) for CH-402

CO Code **Course Outcome**

CO1 Understand the basic principles of spectroscopy and types of interactions between radiation and matter.

CO2 Interpret mass spectra by identifying molecular ion peak, base peak, and isotopic patterns; apply the nitrogen rule and Rule of 13.

CO3 Explain UV spectroscopy principles, recognize chromophores and auxochromes, and apply Woodward-Fieser rules to predict λ-max.

CO4 Analyze IR spectra by identifying functional groups and understanding their absorption patterns and shifts.

CO5 Describe NMR spectral parameters such as chemical shift, integration, coupling, and apply these to simple molecular structures.

CO-PO Mapping Matrix:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	2	3	1
CO2	3	3	3	2	2	2	1
CO3	3	3	3	2	3	2	1
CO4	3	3	3	2	3	2	1
CO5	3	3	3	2	3	2	1

Legend:

3 = strongly related,

2 = moderately related,

1 = slightly related,

- = Not related

F.Y.B.A

English For All

1. To introduce essential skills of oral communication in English.

2. To enable learners to use these skills effectively in academic and non academic contexts.

3 To introduce essential skills of written communication in English

4. To enable learners to use these skills effectively in academic and non academic contexts.

Cos

- Identify the essential skills of oral communication in English
- Communicate effectively and confidently in spoken English.
- Identify the essential skills of written communication in English
- Communicate effectively and confidently in written English

PO–CO Mapping with Justification

COs	Related POs	Mapping Level	Justification
CO1: Identify the essential skills of oral communication in English	PO1	High	Directly linked: CO1 focuses on recognizing oral skills, which is exactly what PO1 introduces.
CO2: Communicate effectively and confidently in spoken English	PO2	High	Strongly aligned: PO2 emphasizes effective use of oral skills in real contexts, which CO2 delivers.
CO3: Identify the essential skills of written communication in English	PO3	High	Fully aligned: CO3 matches the introduction of written skills as intended in PO3.

COs	Related POs	Mapping Level	Justification
CO4: Communicate effectively and confidently in written English	PO4	High	Direct correlation: CO4 ensures learners apply written communication effectively, fulfilling PO4.

S.Y.B.A

DSE 1 A and B (Equivalent to S-I)

Title: 16th and 17th Century English Literature

Objectives

1. To acquaint the students with the major literary trends and tendencies and prominent writers of the 16th and 17th Century English Literature.

2. To make the students aware about the literary history, salient features and sociocultural background of the period.

3. To help the students to grasp the content and critically appreciate the prescribed texts.

4. To inculcate amongst students a liking for the Elizabethan and Post-Shakespearean literature.

Programme Specific Outcomes (PSOs)

PSO Code	Programme Specific Outcome
PSO1	Students will demonstrate knowledge of key literary forms, rhetorical styles and thematic concerns prevalent in 16th and 17th century English literature.
PSO2	Students will interpret literary texts by relating them to the political, religious and cultural transitions shaping the early modern period in England.
PSO3	Students will apply critical approaches to evaluate character, plot construction, poetic devices and dramatic techniques in prescribed texts.
PSO4	Students will develop comparative insights by connecting Elizabethan and post-Shakespearean works to later literary traditions and contemporary relevance.
PSO5	Students will communicate literary ideas effectively through structured academic writing, presentations and classroom dialogue.

CO–PSO Mapping

(3 = High, 2 = Medium, 1 = Low)

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	2	3	2	2	1
CO3	1	2	3	2	2
CO4	1	1	2	3	2

Course Outcomes -

CO Code	Course Outcome	Bloom's Level	Assessment Methods
CO1	Students will be able to identify and describe the major literary movements, forms and notable writers of the 16th and 17th centuries.	Remembering, Understanding	Unit tests, oral questioning, objective tests
CO2	Students will interpret how historical, cultural and social contexts shaped literary expression in this period.	Understanding, Analyzing	Written assignments, presentations, class discussions
CO3	Students will analyze prescribed texts through critical discussion, close reading and literary interpretation.	Analyzing, Evaluating	Term papers, open-book exams, group discussion
CO4	Students will develop appreciation for Elizabethan and Post-Shakespearean literature and discuss its aesthetic and thematic value.	Understanding, Evaluating	Review writing, viva voce, reflective response

CO-PO Mapping -

(3 = High, 2 = Medium, 1 = Low)

COs	PO1	PO2	PO3	PO4
CO1	3	2	1	2
CO2	2	3	2	1
CO3	1	2	3	1
CO4	1	1	2	3

CO Attainment through-

1. **Direct Assessment**
   - Performance in internal tests
   - End-semester examination marks
   - Assignment evaluation
2. **Indirect Assessment**
   - Student feedback
   - Classroom interaction
   - Participation quality

DSC 1 C (equivalent to Sp. English -General Paper II)

The Study of Novel and Drama

Objectives:

1. To develop the interest of students in reading/understanding novel and drama.
2. To acquaint students with Novel and Drama as genres of literature.
3. To develop students' competence to study, understand, analyse and interpret novel and drama.
4. To introduce students with the key terms useful in the study of novel and drama.
3. To orient students with major types of novel and drama.

Programme Specific Outcomes (PSOs)

PSO Code	Programme Specific Outcome
PSO1	Students demonstrate knowledge of fundamental concepts, forms, and structural elements in the study of novels and drama.
PSO2	Students relate literary texts to relevant social, cultural, and historical backgrounds to improve comprehension.
PSO3	Students apply critical approaches to analyze plot, character, setting, and themes in novels and drama.
PSO4	Students identify and explain key literary terms used in the study of narrative and dramatic texts.
PSO5	Students distinguish between major types of novels and drama and evaluate their stylistic features.

Course Outcomes (COs)

CO Code	Course Outcome
CO1	Students will develop interest and motivation in reading and understanding novels and drama.
CO2	Students will identify the characteristics of the novel and drama as distinct literary genres.
CO3	Students will analyze and interpret the prescribed texts using basic literary tools.
CO4	Students will describe and use key terms that are important in studying novels and drama.
CO5	Students will differentiate between major types of novels and drama and explain their features.

CO–PO Mapping

(3 = High, 2 = Medium, 1 = Low)

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	1
CO2	2	3	1	2	1
CO3	1	2	3	1	2
CO4	1	1	2	3	1
CO5	1	1	2	2	3

CO–PSO Mapping

(3 = High, 2 = Medium, 1 = Low)

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	2	3	1	2	1
CO3	1	2	3	1	2
CO4	1	1	2	3	1
CO5	1	1	2	1	3

Attainment Through-

1. **Direct Assessment**
   - Internal tests
   - End-semester exam
   - Assignments
2. **Indirect Assessment**
   - Student feedback
   - Participation

T.Y.B.A – AEC - Developing Communication Skills

Programme Outcomes (POs):

- **PO1**: To acquaint students with various modes of communication.
- **PO2**: To intimate students about various types of written communication.
- **PO3**: To inform the students about various types of communication.
- **PO4**: To give practice to students in various modes of communication.

Course Outcomes (COs)

- **CO1**: Identify and explain various forms of verbal, non-verbal, and visual communication.
- **CO2**: Analyze different types of written communication such as letters, emails, reports, and notices.
- **CO3**: Compare formal and informal communication across different contexts (academic, professional, social).
- **CO4**: Demonstrate the ability to effectively use oral, written, and digital communication tools.
- **CO5**: Apply communication strategies through practical tasks such as role-plays, presentations, and report writing.

CO–PO Correlation Matrix

COs \ POs	PO1 Modes of Communication	PO2 Written Communication	PO3 Types of Communication	PO4 Practice in Modes
CO1: Identify and explain various forms of communication	3	1	3	2

COs \ POs	PO1 Modes of Communication	PO2 Written Communication	PO3 Types of Communication	PO4 Practice in Modes
CO2: Analyze types of written communication	1	3	2	2
CO3: Compare formal and informal communication		2	3	2
CO4: Demonstrate use of oral, written, and digital tools	3	2	2	3
CO5: Apply strategies through role-plays, reports, etc.	2	3	2	3

Justification Table for POs and COs

Code	Outcome Statement	Justification
PO1	To acquaint students with various modes of communication.	Helps learners understand foundational concepts like verbal, non-verbal, and visual communication, essential for personal and professional effectiveness.
PO2	To intimate students about various types of written communication.	Prepares students to identify and use different forms of written communication such as formal letters, reports, and notices, relevant in academic and workplace settings.
PO3	To inform the students about various types of communication.	Provides theoretical knowledge of diverse communication models and types (e.g., interpersonal, intrapersonal, group), enabling informed and context-aware communication.

Code	Outcome Statement	Justification
PO4	To give practice to students in various modes of communication.	Ensures experiential learning by engaging students in real-time practice through presentations, group discussions, and written tasks, fostering confidence and fluency.
CO1	Identify and explain various forms of verbal, non-verbal, and visual communication.	Builds theoretical clarity and recognition of communication modes, serving as the foundation for effective expression.
CO2	Analyze different types of written communication such as letters, emails, reports, and notices.	Develops critical skills to distinguish and produce purpose-specific written content, key for formal and professional communication.
CO3	Compare formal and informal communication across different contexts.	Encourages situational adaptability by helping students tailor communication styles according to audience and setting.
CO4	Demonstrate the ability to effectively use oral, written, and digital communication tools.	Fosters well-rounded communication proficiency, integrating modern technological mediums for comprehensive skill-building.
CO5	Apply communication strategies through role-plays, presentations, and report writing.	Enables students to put theory into practice, enhancing interpersonal and organizational communication competencies.

T.Y.B.A

DSC ENG 1 E: Indian Writing In English

POs-1- To introduce students with English Literature by Indian Writers

POs-2- To acquaint students with major writers of Indian English Literature

POs-3- To introduce Students with content techniques and styles of Indian writers in English.

Cos-1-

1.1-Understand the historical and cultural background of Indian Writing in English.

1.2-Identify the thematic and stylistic elements typical of Indian English literature.

COS-2-

2.1-Recognize and analyze the works of major Indian English writers like R.K. Narayan, Kamala Das, and Arundhati Roy.

2.2 Critically assess the contributions of major Indian authors to the development of Indian English literature

Cos-3

3.1-Evaluate the literary techniques and narrative styles employed by Indian English writers.

3.2- Interpret and discuss diverse content and literary approaches used in poetry, prose, and fiction.

Mapping

COs \ POs	PO1 introduce students with English Literature by Indian Writers	PO2 acquaint students with major writers of Indian English Literature	PO3 introduce Students with content techniques and styles of Indian writers in English.
CO 1.1	3	1	1
CO 1.2	3	1	2
CO 2.1	1	3	2
CO 2.2	1	3	3
CO 3.1	1	2	3
CO 3.2	2	2	3

Justification-

Justification Table: CO–PO Mapping

CO Code	Course Outcome (CO)	POs Addressed	Justification
CO 1.1	Understand the historical and cultural background of Indian Writing in English.	PO1, PO2, PO3	Provides students with context to appreciate Indian writers' contributions and how their works reflect socio-political and cultural realities.
CO 1.2	Identify the thematic and stylistic elements typical of Indian English literature.	PO1, PO3	Helps students recognize recurring themes, narrative voices, and techniques uniquely adopted by Indian English writers.

CO Code	Course Outcome (CO)	POs Addressed	Justification
CO 2.1	Recognize and analyze the works of major Indian English writers.	PO2, PO3	Directly exposes students to literary texts by major Indian authors, developing analytical skills and literary appreciation.
CO 2.2	Critically assess the contributions of major Indian authors.	PO2, PO3	Encourages deeper evaluation of authors' influence, writing styles, and their position in the literary canon of Indian Writing in English.
CO 3.1	Evaluate the literary techniques and narrative styles used by Indian writers in English.	PO3	Focuses on critical literary appreciation of stylistic elements such as structure, voice, language, and technique.
CO 3.2	Interpret and discuss diverse content and literary approaches.	PO1, PO2, PO3	Enables students to explore and articulate various perspectives within Indian English literature, connecting form and content to cultural context.

M.A English -II

Paper I (Core Paper)

PG_ENG_CC 301 & PG- ENG-CC 401

LITERARY CRITICISM AND THEORY

Objectives POs

1-To introduce the students to the wide range of critical approaches and Literary theories.

2. To help the learners to develop logical thinking and analytical ability through intellectually challenging content.

3 To familiarize the learners with the trends and cross disciplinary nature of literary theories.

4 To develop sensibility and competence in them for practical application of various crucial theories in the analysis of literary and cultural texts.

Programme Specific Outcomes (PSOs)

After completing the programme, students will be able to:

PSO1: Demonstrate an understanding of major literary theories and critical approaches in relation to literary and cultural texts.
PSO2: Apply critical and analytical skills to interpret literature through appropriate theoretical frameworks.
PSO3: Evaluate literary texts using cross-disciplinary perspectives and contemporary trends in theory.
PSO4: Communicate theoretical arguments clearly through oral presentations and academic writing.
PSO5: Engage with texts, contexts, and cultures ethically and sensitively while acknowledging diverse viewpoints.

Course Outcomes (COs)

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

CO1: Identify key concepts, terminology, and schools of literary and cultural theories. *(Remembering/Understanding)*
CO2: Explain major trends and cross-disciplinary influences shaping modern literary theory. *(Understanding)*
CO3: Analyze literary and cultural texts through selected theoretical perspectives. *(Analyzing)*
CO4: Compare different theoretical positions and evaluate their relevance to specific texts. *(Evaluating)*
CO5: Apply appropriate theories independently in interpreting themes, characters, structures, and cultural representations. *(Applying/Creating)*

Bloom's Taxonomy Level Mapping

Course Outcome	Bloom's Level(s)
CO1	Remembering, Understanding
CO2	Understanding
CO3	Analyzing
CO4	Evaluating
CO5	Applying, Creating

CO-PSO Mapping (High: 3, Medium: 2, Low: 1)

COs → / PSOs ↓	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	1	1
CO2	2	2	3	1	1
CO3	2	3	2	2	2

COs → / PSOs ↓	PSO1	PSO2	PSO3	PSO4	PSO5
CO4	1	3	3	2	2
CO5	2	3	2	3	3

CO-PO Mapping (general mapping)

COs → / POs ↓	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	1
CO2	2	3	2	1	2
CO3	2	3	2	2	2
CO4	1	3	3	2	2
CO5	2	3	3	3	3

M.A English -II

(Core Paper II)

PG_ENG_CC 302 & PG- ENG-CC 402

THE STUDY OF NOVEL

Objectives- Pos

1 To acquaint the students with the growth, trends, tendencies and development of English novel.

2 To familiarize students with trends and movements in English literature with special reference to English novel.

3 To introduce the students with major novelists in English Literature.

4 To. make them able to appreciate and critically analyze a novel..

5 To sensitize the tudents, through the study of novels, about the world around.

Programme Specific Outcomes (PSOs)

PSO1 Understand the historical development, themes, and narrative features of English novels.
PSO2 Recognize major novelists, movements, and cultural influences shaping the English novel.
PSO3 Apply critical thinking and analytical skills to evaluate narrative structures, characters, and themes.
PSO4 Communicate interpretations of novels in clear written and oral academic formats.
PSO5 Connect literary representations to contemporary social issues and human experiences.

Course Outcomes (COs)

After completing this course, learners will be able to:

CO1 Describe the growth and major stages in the development of the English novel. *(Remembering, Understanding)*
CO2 Explain the key literary movements and trends associated with the development of novels. *(Understanding)*
CO3 Identify important novelists and discuss their contributions. *(Remembering, Understanding)*
CO4 Critically analyze plot, character, setting, and narrative techniques in selected novels. *(Analyzing, Evaluating)*
CO5 Interpret themes and social concerns reflected in novels and relate them to real-world contexts. *(Applying, Evaluating)*

Justification for Course Outcomes

CO1:
Understanding the historical development of the English novel equips students with foundational knowledge of how narrative forms, techniques, and themes evolved over time. This outcome supports informed reading and establishes context for advanced literary study.

CO2:
Familiarity with major literary movements and trends helps students recognize how social, cultural, and intellectual shifts shaped the novel as a genre. It builds awareness of connections between literature and its contemporary environment.

CO3:
Introducing major novelists and their contributions allows learners to study distinct narrative voices and innovations. This outcome promotes recognition of influential authors and their role in shaping the tradition of English fiction.

CO4:
Developing the ability to critically analyze narrative elements strengthens higher-order thinking. Students learn to examine structure, characterization, and technique, leading to deeper interpretation and academic argumentation.

CO5:
Sensitizing students to social issues through novels encourages empathy and critical reflection. Linking textual themes with real-world contexts helps learners understand literature as a lens for examining human experience.

CO-PSO Mapping (High: 3, Medium: 2, Low: 1)

COs → / PSOs ↓	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	2	3	1	1	2
CO3	1	2	3	1	1
CO4	2	1	3	3	2
CO5	1	2	2	2	3

General CO-PO Mapping

COs → / POs ↓ PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	1
CO2	2	3	1	1	2
CO3	2	2	2	1	1
CO4	1	2	3	3	2
CO5	1	2	2	2	3

F.Y.B.A. Geography
Semester- I (NEP 2020 Pattern)
(With effect from June- 2024)
Gg. - 111: (DSC-1) Physical Geography – Lithosphere

The complete academic framework based on your **Physical Geography** syllabus. It includes:

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix (with legend)
4. Brief explanation of CO-PO Mapping

1. Programme Outcomes (POs)

PO Code	Programme Outcome
PO1	Understand the fundamental concepts and principles of physical geography.
PO2	Analyze natural processes and Earth systems influencing landforms and environment.
PO3	Apply knowledge of physical geography to interpret and manage natural resources.
PO4	Use cartographic and geospatial tools to analyze physical geographic features.

PO5	Understand human-environment relationships and promote sustainable development.
PO6	Communicate geographic knowledge effectively through written, oral, and visual formats.
PO7	Develop analytical and research skills for higher studies and problem-solving in geography.

2. Course Outcomes (COs)

CO Code	Course Outcome
CO1	Define geography and explain its branches, particularly physical geography.
CO2	Describe Earth's origin, structure, and motion, and explain effects on time, seasons, and climate.
CO3	Identify major internal Earth layers and explain theories like continental drift and plate tectonics.
CO4	Classify rock types and explain weathering processes contributing to soil formation and landscape changes.
CO5	Explain endogenetic forces (folding, faulting, earthquakes) and related landforms.
CO6	Analyze the work of external agents (river and wind) and their role in shaping the Earth's surface.

3. CO-PO Mapping Matrix

Legend

- **3 = Strongly related**
- **2 = Moderately related**
- **1 = Slightly related**
- **0 = Not related**

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	1	2	2
CO2	3	3	2	1	2	2	2

CO3	3	3	3	2	2	2	2
CO4	2	3	3	2	2	1	2
CO5	2	3	3	2	2	1	2
CO6	2	3	3	3	3	2	3

4. Brief CO-PO Mapping Explanation (Physical Geography)

The **CO-PO mapping** illustrates how the **Physical Geography syllabus** supports the overall programme outcomes:

- **CO1 and CO2** provide foundational understanding of **geography and Earth systems**, strongly aligned with **PO1 and PO2**.
- **CO3 to CO5** deal with internal Earth processes, rock formation, tectonic activity, and landform development — directly supporting **PO2 (Earth processes)**, **PO3 (natural resources management)**, and **PO5 (sustainability)**.
- **CO6** focuses on **external geomorphic agents** like rivers and wind, which are critical in **agricultural landform formation** and **terrain analysis**, strongly aligned with **PO3, PO4, and PO5**.
- All COs are also moderately aligned with **PO6** (communication) and **PO7** (lifelong learning and research), as students are expected to present and interpret geographic information using scientific and cartographic skills.

F.Y.B.A. Geography
Semester- II (NEP 2020 Pattern)
(With effect from June- 2024)
Gg. 121 (DSC-2) Physical Geography - Atmosphere & Hydrosphere

The **Atmosphere and Hydrosphere** syllabus you just provided (which is part of a broader **Physical Geography** course), here's a complete academic framework with:

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix with Legend
4. A brief explanation of the CO-PO Mapping

1) Programme Outcomes (POs)

PO Code	Programme Outcome
PO1	Understand the basic concepts and components of physical geography.
PO2	Analyze the physical processes of atmosphere and hydrosphere that shape Earth's systems.
PO3	Apply knowledge of climatic and oceanic phenomena to real-world geographical issues.
PO4	Interpret maps, charts, and meteorological/oceanographic data.
PO5	Understand the role of physical geography in climate change, weather forecasting, and disaster preparedness.
PO6	Communicate geographic concepts using appropriate technical and academic language.
PO7	Develop analytical thinking and research skills for higher education or careers in geography.

2) Course Outcomes (COs)

CO Code	Course Outcome
CO1	Define atmosphere, explain its composition and structure.
CO2	Understand insolation, air temperature variations, and influencing factors.
CO3	Explain atmospheric pressure, pressure belts, and classification of winds.

CO4	Describe humidity, condensation processes, precipitation types, and mechanisms of rainfall.
CO5	Identify features of the ocean floor and describe submarine relief in major oceans.
CO6	Analyze movement of ocean water, causes and effects of ocean currents in the Atlantic and Indian Oceans.

3) CO-PO Mapping Matrix

Legend

- **3 = Strongly related**
- **2 = Moderately related**
- **1 = Slightly related**
- **0 = Not related**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	2	2	1
CO2	2	3	3	2	3	2	2
CO3	2	3	3	3	3	2	2
CO4	2	3	3	2	3	2	2
CO5	3	2	2	2	2	1	1
CO6	3	3	3	3	3	2	2

4) Brief Explanation of CO-PO Mapping (Physical Geography: Atmosphere & Hydrosphere)

The **CO-PO mapping** demonstrates how the course outcomes (COs) align with and support the broader **programme outcomes (POs)**:

- **CO1 & CO2** provide **conceptual foundations** of atmospheric science, directly supporting **PO1 and PO2**, and also introducing applications relevant to **PO3 and PO5**.
- **CO3 & CO4** explore atmospheric pressure systems, wind patterns, humidity, and precipitation, all of which are vital for understanding **climate systems**, **agriculture**, and **disaster management**, contributing strongly to **PO3, PO5** and moderately to **PO4 and PO6**.

- **CO5 & CO6** shift focus to the **hydrosphere**, covering **ocean floor features** and **ocean currents**, which are critical for understanding **global climatic systems**, **marine navigation**, and **fishing zones**, thus aligning well with **PO2, PO3, and PO5**.
- All COs involve interpretation of data and visual representation (maps, diagrams), connecting with **PO4 and PO6**, while research-based inquiry and scientific thinking map to **PO7**.

PROGRAM OUTCOMES (POs)
B.A. Geography (NEP 2020 Pattern)

PO1: Comprehensive Geographic Knowledge
Students will develop a strong foundation in physical, human, economic and regional geography, including core concepts, theories and spatial relationships.

PO2: Spatial Analysis and Technical Skills
Students will acquire skills in map interpretation, cartography, GIS, remote sensing, field techniques and spatial data analysis.

PO3: Research and Field Competency
Students will be able to conduct field surveys, collect and analyze data, prepare project reports and apply research methodology in geographical studies.

PO4: Environmental and Sustainability Awareness
Students will understand human–environment interactions, environmental challenges, sustainable development and resource management.

PO5: Critical Thinking and Problem Solving
Students will develop the ability to analyze geographical issues logically, interpret spatial patterns and propose practical solutions.

PO6: Employability and Professional Readiness
Students will be prepared for careers in planning, environmental management, geospatial technologies, tourism, government services and higher education.

COURSE OUTCOMES (COs)

Below are structured COs for each paper in Semester III and IV.

SEMESTER III

Course Code: DSC-7

Course Title: Geography of Tourism

Course Outcomes (COs)

CO1: Understand the concept, types and components of tourism.
CO2: Analyze spatial distribution and regional patterns of tourism.
CO3: Evaluate environmental, economic and socio-cultural impacts of tourism.
CO4: Assess tourism potential and sustainable tourism strategies.

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓			✓	✓	
CO2	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓

Course Code: DSC-8

Course Title: Practical in Cartographic Techniques

Course Outcomes (COs)

CO1: Understand types of scales and projections.
CO2: Construct and interpret map projections.
CO3: Apply cartographic techniques in map preparation.
CO4: Develop skills in spatial accuracy and representation.

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓	✓			✓	
CO2	✓	✓	✓		✓	
CO3	✓	✓	✓		✓	✓
CO4	✓	✓	✓		✓	✓

Course Code: DSC-9

Course Title: Ancient Geographical Thoughts in India

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓			✓	✓	
CO2	✓		✓	✓	✓	
CO3	✓	✓	✓	✓	✓	
CO4	✓		✓	✓	✓	

Course Code: MIN-1

Course Title: Human Geography

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓			✓	✓	

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO2	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓

Course Code: SEC-1

Course Title: Fundamentals of Remote Sensing – I

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓	✓		✓	✓	
CO2	✓	✓	✓	✓	✓	
CO3	✓	✓	✓		✓	✓
CO4	✓	✓	✓	✓	✓	✓

SEMESTER IV

Course Code: DSC-10

Course Title: Geography of Trade and Transport

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓				✓	

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO2	✓	✓	✓		✓	
CO3	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓

Course Code: DSC-11

Course Title: Practical Geography (Surveying)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓	✓			✓	
CO2	✓	✓	✓		✓	✓
CO3	✓	✓	✓		✓	✓
CO4	✓	✓	✓	✓	✓	✓

Course Code: VSC-2

Course Title: Project Report Writing

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓		✓		✓	
CO2	✓	✓	✓	✓	✓	

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO3	✓	✓	✓	✓	✓	✓
CO4	✓		✓		✓	✓

Course Code: SEC-2

Course Title: Fundamentals of Remote Sensing – II

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	✓	✓		✓	✓	
CO2	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓

If you want, I can now:

B.A. Geography Programme Outcomes (TYBA)

PO1: Advanced Geographic Knowledge
PO2: Analytical and Spatial Skills
PO3: Research and Statistical Competency
PO4: Environmental and Sustainability Awareness

PO5: Critical Thinking and Policy Understanding
PO6: Employability and Professional Skills

SEMESTER V

==========

Course Code: Gg.351 (DSC 1E)

Course Title: Environmental Geography

Course Outcomes (COs)

CO1: Understand fundamental concepts and approaches in Environmental Geography.
CO2: Analyze ecosystem structure and human–environment relationships.
CO3: Evaluate biodiversity and environmental problems.
CO4: Understand environmental policies and management strategies.

CO–PO Mapping (Correlation Levels)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	3	2	1
CO2	3	3	2	3	2	1
CO3	3	3	2	3	3	2
CO4	3	2	1	3	3	2

Course Code: Gg.352 (DSE 3A)

Course Title: Economic Geography

COs

CO1: Understand concepts and approaches of Economic Geography.
CO2: Analyze economic activities and agricultural types.
CO3: Evaluate industrial location theories and development models.
CO4: Assess minerals, industries and trade patterns.

CO–PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	1	2	1
CO2	3	3	2	2	2	2
CO3	3	3	2	1	3	2
CO4	3	3	2	2	3	3

Course Code: Gg.353 (DSE 4A)

Course Title: Practical in Human Geography & Geo-Statistics

COs

CO1: Calculate demographic indicators and agricultural indices.
CO2: Apply statistical techniques in geographical studies.
CO3: Analyze geographical data using statistical methods.
CO4: Interpret statistical results in spatial context.

CO–PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	3	1	2	2
CO2	2	3	3	1	2	2

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO3	2	3	3	1	3	2
CO4	2	3	3	1	3	2

Course Code: Gg.354 (SEC 3)

Course Title: Field Techniques & Project Report

COs

CO1: Understand fieldwork concepts and research ethics.
CO2: Design questionnaires and sampling techniques.
CO3: Conduct field surveys and collect primary data.
CO4: Prepare structured project reports.

CO–PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2	1	2	1
CO2	2	3	3	1	2	2
CO3	2	3	3	1	2	3
CO4	2	2	3	1	3	3

Course Code: Gg.355 (GE 1A)

Course Title: Disaster Risk Reduction

COs

CO1: Understand disaster concepts and risk assessment.
CO2: Analyze disaster types and impacts in India.
CO3: Evaluate mitigation and preparedness strategies.
CO4: Understand DRM planning and role of Remote Sensing.

CO–PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	3	2	1
CO2	3	3	2	3	2	2
CO3	3	3	2	3	3	2
CO4	3	3	2	3	3	2

SEMESTER VI

==========

Course Code: Gg.361 (DSC 1F)

Course Title: Population Geography

CO–PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	2	2	1
CO2	3	3	2	2	2	2
CO3	3	3	2	2	3	2
CO4	3	2	1	2	3	2

Course Code: Gg.362 (DSE 3B)

Course Title: Political Geography

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	1	2	1
CO2	3	2	1	1	3	2
CO3	3	3	1	1	3	2
CO4	3	2	1	1	3	2

Course Code: Gg.363 (DSE 4B)

Course Title: Practical in Physical Geography

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	2	1	2	2
CO2	2	3	2	1	2	2
CO3	2	3	2	2	2	2
CO4	2	2	2	2	2	3

Course Code: Gg.364 (SEC 4)

Course Title: Geographical Information System

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	2	2	2
CO2	3	3	2	2	2	2
CO3	3	3	2	2	3	3
CO4	3	3	2	3	3	3

Course Code: Gg.365 (GE 1B)

Course Title: Sustainability and Development

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	3	2	1
CO2	3	2	1	3	2	1
CO3	3	3	2	3	3	2
CO4	3	2	1	3	3	2

NAAC COURSE OUTCOME ATTAINMENT FORMAT

==========

1. Direct Attainment (80%)

Based on University Examination (60%) + Internal Assessment (40%)

Step 1: Set Target
Example: 50% students scoring ≥ 50% marks.

Step 2: Define Attainment Levels

Level 3 (High) = ≥ 60% students above target
Level 2 (Moderate) = 50–59% students above target
Level 1 (Low) = 40–49% students above target

Step 3: CO Attainment Calculation

CO Attainment =
(Number of students achieving target / Total students) × 3

Example:
If 45 out of 60 students score ≥ 50%

45/60 = 0.75
0.75 × 3 = 2.25

CO Attainment Level = 2.25

---

2. Indirect Attainment (20%)

Based on:

• Student feedback
• Alumni feedback
• Exit survey

Average feedback score converted to scale of 3.

---

3. Final CO Attainment Formula

Final CO Attainment =
(Direct Attainment × 0.8) + (Indirect Attainment × 0.2)

Example:

Direct = 2.4
Indirect = 2.8

Final = (2.4 × 0.8) + (2.8 × 0.2)
= 1.92 + 0.56
= 2.48

---

4. PO Attainment Calculation

PO Attainment =
Σ (CO Attainment × CO–PO Correlation Level)
/ Total Correlation Values

This is how NAAC expects structured documentation.

F.Y.B.Sc. Geography
Semester- I (NEP 2020 Pattern) WEF 2024
GG:111 (DSC-1): Introduction to Lithosphere

Programme Outcomes (POs)

PO Code	Programme Outcome Statement
PO1	Understand the foundational concepts of Physical Geography and Earth sciences.
PO2	Develop scientific and analytical thinking for interpreting geographical processes.
PO3	Apply geographic knowledge to analyze natural phenomena and environmental challenges.

PO4	Use spatial tools and skills to observe and interpret physical features and processes.
PO5	Demonstrate awareness of sustainable use of Earth resources and natural hazard management.

Course Outcomes (COs)

CO Code	Course Outcome Statement
CO1	Explain the definition, nature, and scope of Physical Geography.
CO2	Understand and identify branches of Physical Geography.
CO3	Describe the Earth's structure and classify landforms.
CO4	Evaluate the present distribution of land and water and related theories.
CO5	Differentiate types of rocks and explain their characteristics and distribution.
CO6	Analyze Earth's forces and understand geological events like folds, faults, earthquakes, and volcanoes.

CO-PO Mapping Matrix

COs / POs	PO1 (Literary Knowledge)	PO2 (Communication)	PO3 (Research Skills)	PO4 (Research Skills)	PO5 (Ethics & Culture
CO1	3	2	1	1	1
CO2	3	2	1	2	1
CO3	3	3	2	2	2
CO4	3	3	3	3	2
CO5	2	3	3	2	3
CO6	3	3	3	3	3

Legend (Scale of Contribution):

Score	Level of Correlation
3	Strong Contribution
2	Moderate Contribution
1	Low Contribution
0	No Contribution

Score	Level of Correlation

Interpretation of Mapping:

The **CO-PO Mapping Matrix** shows how each **Course Outcome (CO)** contributes to achieving the broader **Programme Outcomes (POs)**.

- **CO1 and CO2** focus primarily on **basic theoretical knowledge** (PO1) with some contribution to communication and basic research skills.
- **CO3** strengthens **conceptual understanding** and improves students' **analytical thinking**, showing good alignment with PO1 to PO4.
- **CO4** is the most well-rounded, with **strong contributions across all POs**, especially in building **research, communication**, and **practical skills**.
- **CO5** emphasizes **data representation through statistical tools**, aligning well with **communication (PO2)**, **research (PO3)**, and **ethical application (PO5)**.
- **CO6** has the **strongest contribution** to all five POs, reflecting its comprehensive nature—it involves interpretation, construction, and ethical use of maps and data.

*****

F.Y.B.Sc. Geography
Semester- I (NEP 2020 Pattern) WEF – June 2024
DSC-2 (GG. -112): Practical in Cartography Techniques

Programme Outcomes (POs):

PO Code	Programme Outcome Statement
PO1	Understand basic concepts and techniques in Cartography and mapping. *(Literary Knowledge)*
PO2	Develop communication and representation skills through graphical and statistical techniques. *(Communication)*
PO3	Apply mapping and diagrammatic tools for spatial data analysis. *(Research Skills)*
PO4	Gain hands-on experience in map construction and interpretation. *(Practical & Technical Skills)*
PO5	Foster appreciation for scientific methods and ethical use of spatial data. *(Ethics & Culture)*

Course Outcomes (COs)

CO Code	Course Outcome Statement
CO1	Understand the meaning, concept, and importance of Cartography and Maps.
CO2	Learn the concept of map scales, methods of scale representation, and perform scale conversions.
CO3	Construct graphical scales and apply distance and time scales using metric systems.
CO4	Define and construct various graphs; evaluate their uses, merits, and limitations.
CO5	Explain and construct statistical diagrams and assess their effectiveness.
CO6	Understand and interpret different types of distributional maps, including their advantages and limitations.

CO-PO Mapping Matrix

COs / POs	PO1 (Literary Knowledge)	PO2 (Communication)	PO3 (Research Skills)	PO4 (Practical Skills)	PO5 (Ethics & Culture)
CO1	3	2	1	1	1
CO2	3	2	2	3	1
CO3	3	2	2	3	2
CO4	2	3	3	3	2
CO5	2	3	3	3	2
CO6	3	2	3	3	3

Legend: Scale of Contribution

Score	Level of Correlation
3	Strong Contribution
2	Moderate Contribution
1	Low Contribution
0	No Contribution

Interpretation of Mapping:

The mapping matrix shows that all course outcomes (COs) are well-aligned with the overall programme objectives (POs).

- **CO1** has a strong focus on basic conceptual knowledge (PO1) and moderate relevance to communication and practical skills.
- **CO2** and **CO3** show strong alignment with both theoretical understanding (PO1) and practical skill application (PO4), as students learn about map scales and their construction.
- **CO4** and **CO5**, related to graph and diagram construction, strongly support the development of research, communication, and practical skills (PO2, PO3, PO4).
- **CO6**, focusing on distributional maps, shows the **highest alignment across all POs**, especially in integrating ethical use of spatial data (PO5), along with research and practical skills.

Overall, the matrix indicates that the course offers a **balanced development** of theoretical knowledge, technical skills, communication abilities, and ethical awareness.

*****

F.Y.B.Sc./F.Y.B.A. Geography
Semester- I (NEP 2020 Pattern) WEF 2024
GG: 113 (OE-1): Agricultural Geography

Programme Outcomes (POs)

PO Code	Programme Outcome Statement
PO1	Acquire foundational knowledge in Agricultural and Human Geography.
PO2	Apply geographic techniques to study agricultural systems and practices.
PO3	Analyze spatial and socio-economic patterns affecting agriculture.
PO4	Understand environmental impacts and human-environment interactions in agriculture.
PO5	Develop critical thinking to solve agricultural issues and promote sustainability.

Course Outcomes (COs)

CO Code	Course Outcome Statement
CO1	Understand the nature, scope, and importance of Agricultural Geography.
CO2	Explain different approaches to the study of agriculture.
CO3	Identify and evaluate physical, economic, social, and technological factors affecting agriculture.
CO4	Classify different types of agriculture and assess challenges in Indian agriculture.
CO5	Understand the importance of agricultural revolutions and irrigation methods in India.

CO-PO Mapping Matrix –

COs \ POs	PO1 Knowledge)	PO2 Skills)	PO3 Analysis)	PO4 Env. Awareness)	PO5 Critical Thinking)
CO1	3	2	1	2	2
CO2	3	2	2	2	2
CO3	3	3	3	3	3

CO4	3	2	3	3	3
CO5	3	2	2	3	2

Legend: Scale of Contribution

Score	Level of Correlation
3	Strong Contribution
2	Moderate Contribution
1	Low Contribution
0	No Contribution

Interpretation of CO-PO Mapping :

The course **Agricultural Geography** contributes strongly to the overall programme objectives.

- **CO1 and CO2** provide foundational knowledge and understanding of agricultural geography and its theoretical approaches, supporting PO1 and PO2.
- **CO3 and CO4** offer strong alignment across all POs, particularly in **analytical, practical, and critical thinking skills** related to agricultural factors and systems.
- **CO5** enhances knowledge of **agricultural revolutions and irrigation**, connecting well with **environmental understanding and problem-solving** (PO4, PO5).

This course ensures a **balanced development** of theoretical knowledge, analytical abilities, and practical awareness of agriculture-related challenges and solutions.

F.Y.BSc. Geography
Semester- I (NEP 2020 Pattern)
(With effect from June- 2024)
DSC-2 (GG. -112): Practical in Cartography Techniques

Here is a comprehensive academic framework based on your **"Practical in Cartography Techniques"** syllabus. This includes:

1. Programme Outcomes (POs)

PO Code	Programme Outcome
PO1	Understand core concepts and fundamentals of geography and cartography.
PO2	Apply cartographic and statistical techniques for geographical analysis.
PO3	Interpret and construct maps, diagrams, and graphs for spatial representation.
PO4	Utilize geospatial and metric tools for data analysis and map construction.
PO5	Develop critical thinking and technical skills in map reading and data visualization.
PO6	Communicate spatial data effectively using appropriate cartographic methods.
PO7	Prepare for further research, academic, or professional work in geographical sciences.

2. Course Outcomes (COs)

CO Code	Course Outcome
CO1	Understand the meaning, scope, and importance of cartography and map types.
CO2	Demonstrate knowledge of scale types, conversions, and graphical scale construction.
CO3	Construct and interpret various statistical graphs such as polyline, bar graphs, and combined graphs.
CO4	Draw and explain statistical diagrams like star diagrams, divided circles, and proportional circles.
CO5	Analyze and construct distributional maps (Dot, Choropleth, and Isopleth maps) and explain their geographical relevance.

3. CO-PO Mapping Matrix

Legend

- **3 = Strongly Related**
- **2 = Moderately Related**
- **1 = Slightly Related**
- **0 = Not Related**

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	2	2	1
CO2	2	3	3	3	3	2	2
CO3	1	3	3	2	2	2	2
CO4	1	3	2	2	2	2	2
CO5	2	3	3	3	3	3	2

4. Brief Explanation of CO-PO Mapping (Cartography Practical)

The **CO-PO Mapping** reflects how each course outcome supports the broader **programme goals**:

- **CO1** introduces fundamental concepts of cartography and maps, aligned with **PO1 (basic knowledge)** and **PO6 (communication of geographic data)**.
- **CO2** builds technical understanding of **scales and conversions**, strongly contributing to **PO2 (technical application)**, **PO3 (map construction)**, and **PO4 (tools usage)**.
- **CO3 & CO4** focus on drawing and interpreting **graphs and diagrams**, supporting **PO2, PO3, and PO6** with practical, data-focused skills.
- **CO5** emphasizes the creation and use of **distributional maps**, aligning very well with **PO2 to PO6**, especially regarding **spatial analysis, representation, and communication**.

Overall, the course develops **practical map-making, data visualization, and interpretation skills**, essential for **geographic research**, **field studies**, and **academic visualization**.

F.Y.BSc. Geography
Semester- II (NEP 2020 Pattern)
(With effect from June- 2024)
GG 122 (DSC-4): Practical in Map Projections

The **Programme Outcome (POs)**, **Course Outcome (COs)**, and **CO-PO Mapping Matrix** for the **Practical in Map Projections** syllabus you provided.

✅ 1. Programme Outcomes (POs)

PO Code	Programme Outcome
PO1	Understand the fundamental concepts of cartography, map projections, and spatial representation.
PO2	Apply practical skills in constructing and interpreting map projections through graphical methods.
PO3	Classify different types of map projections and their suitability for various geographic areas.
PO4	Use appropriate map projections based on geographical regions, scales, and thematic purposes.
PO5	Evaluate and understand the distortions (area, shape, size, and direction) in various map projections.
PO6	Communicate effectively the strengths, weaknesses, and uses of different map projections in geography.
PO7	Develop technical and critical thinking skills for research, academic, or professional work in geospatial sciences.

2. Course Outcomes (COs)

CO Code	Course Outcome
CO1	Define and explain map and globe concepts, including latitude, longitude, and great circles.
CO2	Understand the concept and necessity of map projections in cartography.
CO3	Classify map projections into categories like perspective, non-perspective, and conventional projections.

CO4	Construct graphical map projections, including Zenithal, Conical, and Cylindrical projections.
CO5	Evaluate and choose appropriate map projections based on region and purpose, understanding distortion (area, shape, size).

3. CO-PO Mapping Matrix

Legend

- **3 = Strongly Related**
- **2 = Moderately Related**
- **1 = Slightly Related**
- **0 = Not Related**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	1	1	2	1
CO2	2	3	2	2	2	2	2
CO3	1	2	3	2	2	2	2
CO4	1	3	3	3	2	2	3
CO5	2	2	3	3	3	3	2

4. Brief Explanation of CO-PO Mapping (Practical in Map Projections)

The **CO-PO Mapping** indicates how the practical learning outcomes (COs) align with the overall programme objectives (POs):

- **CO1 & CO2** focus on **conceptual understanding** of maps, projections, and their **necessity**. These are linked to **PO1** (basic knowledge) and **PO6** (communication), with moderate emphasis on **PO2** (practical application).
- **CO3** helps students **classify map projections** and understand their **different types**, directly linking to **PO3** (classification and analysis), with moderate importance for **PO2** and **PO4** (appropriate selection for specific regions).
- **CO4** deals with the **graphical construction** of various map projections, contributing strongly to **PO2** (skills), **PO4** (appropriate selection of projections), and **PO7** (research and practical skills in cartography).

- **CO5** addresses the **evaluation** and **choice of map projections** based on geographical contexts, directly supporting **PO4** (application), **PO5** (distortion analysis), and **PO6** (communication of projection effectiveness).

S.Y.BSc. Geography
Semester- III (NEP 2020 Pattern)
(With effect from June- 2025)
GG-214 (MIN-1): Physical Geography of India

The complete academic framework based on syllabus for **"Physical Geography of India"**,

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix (with Legend)
4. Brief explanation of the CO-PO Mapping

1) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand the fundamental physical geography of India.
PO2	Analyze climate systems, physiographic regions, and drainage patterns.
PO3	Evaluate the distribution and characteristics of soils and vegetation in India.
PO4	Develop skills to interpret physical maps and analyze environmental processes.
PO5	Identify environmental challenges like soil degradation and deforestation and suggest solutions.

2) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Describe the location, extent, and major physiographic divisions of India.
CO2	Explain the climatic characteristics, monsoon system, and rainfall distribution in India.
CO3	Identify and analyze the major river systems and drainage patterns of India.

CO4	Describe types, distribution, and problems associated with soils in India.
CO5	Explain the major types of natural vegetation and assess the causes and effects of deforestation.

3) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2		2	1
CO2	2	3		2	2
CO3	3	3		2	2
CO4		2	3	2	3
CO5		2	3	2	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

4) Brief Explanation of CO-PO Mapping

- **CO1** (Physiography): Strongly supports **PO1** as it introduces the foundational physical geography of India. It also contributes to **PO2** (understanding landforms) and **PO4** (map interpretation).
- **CO2** (Climate): Strongly aligns with **PO2** as it covers the monsoon and rainfall systems, crucial in Indian climatology. It also supports **PO4** and **PO5** by fostering environmental analysis and awareness of climatic impacts.
- **CO3** (Drainage): Closely linked to **PO1**, **PO2**, and **PO4**. Understanding river systems enhances comprehension of both natural geography and human settlement patterns. It has moderate relevance to **PO5** due to implications for water resource management.
- **CO4** (Soils): Strongly supports **PO3** and **PO5** through the study of soil types and degradation. It also enhances skills related to **PO4**, such as analyzing soil maps.

- **CO5** (Vegetation and Deforestation): Strongly supports **PO3** and **PO5** through discussion of forest types, ecological zones, and conservation issues. Also ties into **PO4** with vegetation zone mapping and interpretation.

S.Y.BSc. Geography
Semester- IV (NEP 2020 Pattern)
(With effect from June- 2025)
GG-223 (MIN-4): Economic Geography of India

The complete academic framework based on syllabus for **"Economic Geography of India"**,

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix (with Legend)
4. Brief explanation of the CO-PO Mapping

1) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand the geographical and economic importance of agriculture and natural resources.
PO2	Analyze the spatial distribution of resources and industries across India.
PO3	Evaluate the relationship between geography, agriculture, and industrial development.
PO4	Apply geographical knowledge to study regional development and resource planning.
PO5	Understand sustainable practices in agriculture, energy, and industry.

2) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Describe the role and features of Indian agriculture, major crops, and new trends like agro-tourism and agro-forestry.
CO2	Identify and analyze the distribution and production of key natural resources in India.
CO3	Understand the evolution of Indian industries and major industrial developments during the planning era.
CO4	Examine the spatial distribution and characteristics of major industries and industrial regions in India.

3) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	3	3	2	3	2
CO3	2	3	3	2	2
CO4	2	3	3	3	2

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

4) Brief Explanation of CO-PO Mapping

- **CO1** (Indian Agriculture): Has strong correlations with **PO1** (economic importance), **PO3** (link with development), and **PO5** (sustainable practices). It also supports **PO2** and **PO4** through crop distribution and farming types.
- **CO2** (Resources): Strongly supports **PO1**, **PO2**, and **PO4** as students learn the spatial distribution of natural resources like coal, iron, and solar energy. It also links moderately with **PO5**, promoting awareness of sustainable resource use.
- **CO3** (Industry Evolution): Strongly linked to **PO2** and **PO3**, focusing on how geographical factors and planning influenced industrial growth. Also contributes to understanding development (**PO4**) and sustainability (**PO5**).
- **CO4** (Industrial Regions): Strong correlation with **PO2**, **PO3**, and **PO4** as it involves spatial analysis and the role of regions in economic geography. Also moderately supports **PO5** by contextualizing industrial environmental impact.

S.Y.BSc. Geography
Semester- III (NEP 2020 Pattern)
(With effect from June- 2025)
GG-216 (MIN-3): Practical in SOI Topographical Maps

The complete academic framework based on syllabus for **"Practical in SOI Topographical Maps"**,

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix (with Legend)
4. Brief explanation of the CO-PO Mapping

1) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand and explain geographic relief and its representation using cartographic techniques.
PO2	Acquire practical skills in interpreting topographical maps and terrain features.
PO3	Apply concepts of relief and contour interpretation for analyzing physical landscapes.
PO4	Interpret spatial and physical data using symbols, grid references, and mapping conventions.
PO5	Develop analytical skills to interpret human and physical features from topographical sheets.

2) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Define relief and explain various quantitative and qualitative methods for its representation.
CO2	Identify and interpret various landforms and slopes using contour lines.
CO3	Understand topographical maps, their indexing, and the use of conventional symbols and grid references.
CO4	Interpret topographical sheets to analyze natural and human-made features in different landscapes (plain, plateau, mountains).

3) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	1
CO2	3	3	3	3	2
CO3	2	3	2	3	2
CO4	2	3	3	3	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

4) Brief Explanation of CO-PO Mapping

- **CO1** (Relief and Representation Methods): Strongly aligns with **PO1** and **PO4** as students learn both the theory and representation techniques (contours, hachures, etc.). It also supports **PO2** and **PO3** at a foundational level.
- **CO2** (Contour-based Features): Closely linked to **PO2**, **PO3**, and **PO4** as it involves identifying physical landforms and interpreting terrain profiles using contour lines. Also contributes to **PO5** through landscape analysis.
- **CO3** (Topographical Maps): Strong alignment with **PO2** and **PO4**, since students gain map reading skills, symbol recognition, and coordinate referencing. It supports **PO3** and **PO5** at a moderate level.
- **CO4** (Topo-map Interpretation): Strongly supports **PO2**, **PO3**, **PO4**, and **PO5** as students learn to interpret full topographical maps including natural and human features, making it a capstone skill in geographic analysis.

S.Y.BSc. Geography
Semester- IV (NEP 2020 Pattern)
(With effect from June- 2025)
GG-224 (MIN-5): Practical in Surveying

The complete academic framework based on syllabus for **"Practical in Surveying"**,

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix (with Legend)
4. Brief explanation of Practical in Surveying the CO-PO Mapping

1) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand fundamental concepts, types, and methods of land surveying.
PO2	Acquire technical knowledge and practical skills in traditional and modern surveying techniques.
PO3	Analyze and apply different surveying methods in real-world geographical fieldwork.
PO4	Use spatial tools and measurements (like GPS and Plane Table) for data collection and mapping.
PO5	Conduct fieldwork, interpret data, and present findings in the form of a professional survey report.

2) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Define surveying and explain its types, methods, and relevance in geography.
CO2	Understand and perform Plane Table Survey using proper instruments and methods.
CO3	Explain the components and applications of GPS and conduct GPS-based surveys.
CO4	Apply knowledge through fieldwork (excursion or village survey) and prepare a detailed report.

3) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	1
CO2	2	3	3	3	2
CO3	2	3	3	3	2
CO4	2	2	3	2	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

4) Brief Explanation of CO-PO Mapping

- **CO1** (Introduction to Surveying): Strongly linked with **PO1**, as it covers basic definitions, types, and methods. It moderately supports **PO2**, **PO3**, and **PO4** by providing foundational knowledge.
- **CO2** (Plane Table Survey): Strongly supports **PO2**, **PO3**, and **PO4**, as students gain hands-on experience in manual surveying techniques. Also contributes to **PO5** through field measurements and analysis.
- **CO3** (GPS Survey): Has strong correlations with **PO2**, **PO3**, and **PO4** due to its modern approach to surveying using technology. Moderate contribution to **PO5** as students collect and analyze GPS data.
- **CO4** (Excursion/Village Survey): Strongly supports **PO3** and **PO5** by applying all theoretical and practical knowledge into real-life fieldwork and report writing. It also moderately supports **PO1** and **PO2** through planning and execution.

S.Y.B.Sc. Geography
Semester- III (NEP-2020 Pattern) WEF June- 2025
GG-215 (MIN-2): Human Geography

Programme Outcomes (POs) :

PO Code	Programme Outcome Statement
PO1	Gain foundational knowledge of Human Geography and its key concepts.
PO2	Develop an understanding of human-environment relationships.
PO3	Analyze human spatial behavior using different geographic approaches.
PO4	Appreciate cultural diversity, ethnic groups, and tribal communities.
PO5	Build critical thinking to assess societal and regional human issues.

Course Outcomes (COs) –

CO Code	Course Outcome Statement
CO1	Define and explain the nature, scope, and branches of Human Geography.
CO2	Understand and evaluate different man-environment relationship theories.
CO3	Interpret various approaches to the study of Human Geography.
CO4	Explain the concept, classification, and characteristics of major human races.
CO5	Describe racial and ethnic groups in India and understand tribal communities like Bushman and Gond.

CO-PO Mapping Matrix –

COs\ POs	PO1 (Knowledge)	PO2 (Man-Environment)	PO3 (Approaches)	PO4 (Culture & Diversity)	PO5 (Critical Thinking)

CO1	3	2	2	1	2
CO2	3	3	2	1	3
CO3	2	2	3	1	2
CO4	3	1	1	3	2
CO5	2	1	1	3	3

Legend: Scale of Contribution

Score	Level of Correlation
3	Strong Contribution
2	Moderate Contribution
1	Low Contribution
0	No Contribution

Interpretation of CO-PO Mapping –

The **Human Geography** course builds a strong base in theoretical understanding (PO1), especially in **CO1 and CO2**.

- **CO2 and CO3** emphasize the relationship between humans and their environment through different philosophical approaches.
- **CO4 and CO5** focus on **racial diversity, tribal societies**, and **ethnic understanding**, aligning well with PO4 and PO5.
- The course integrates **knowledge, critical analysis, and cultural appreciation**, making it ideal for students exploring **human-environment dynamics** and **cultural diversity** in geography.

S.Y.BSc. Geography
Semester- III (NEP 2020 Pattern)
(With effect from June- 2025)
GG-216 (MIN-3): Practical in SOI Topographical Maps

The complete academic framework based on syllabus for **"Practical in SOI Topographical Maps"**,

5. Programme Outcomes (POs)
6. Course Outcomes (COs)
7. CO-PO Mapping Matrix (with Legend)
8. Brief explanation of the CO-PO Mapping

4) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand and explain geographic relief and its representation using cartographic techniques.
PO2	Acquire practical skills in interpreting topographical maps and terrain features.
PO3	Apply concepts of relief and contour interpretation for analyzing physical landscapes.
PO4	Interpret spatial and physical data using symbols, grid references, and mapping conventions.
PO5	Develop analytical skills to interpret human and physical features from topographical sheets.

5) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Define relief and explain various quantitative and qualitative methods for its representation.
CO2	Identify and interpret various landforms and slopes using contour lines.
CO3	Understand topographical maps, their indexing, and the use of conventional symbols and grid references.
CO4	Interpret topographical sheets to analyze natural and human-made features in different landscapes (plain, plateau, mountains).

6) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	1
CO2	3	3	3	3	2
CO3	2	3	2	3	2
CO4	2	3	3	3	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

4) Brief Explanation of CO-PO Mapping

- **CO1** (Relief and Representation Methods): Strongly aligns with **PO1** and **PO4** as students learn both the theory and representation techniques (contours, hachures, etc.). It also supports **PO2** and **PO3** at a foundational level.
- **CO2** (Contour-based Features): Closely linked to **PO2**, **PO3**, and **PO4** as it involves identifying physical landforms and interpreting terrain profiles using contour lines. Also contributes to **PO5** through landscape analysis.
- **CO3** (Topographical Maps): Strong alignment with **PO2** and **PO4**, since students gain map reading skills, symbol recognition, and coordinate referencing. It supports **PO3** and **PO5** at a moderate level.
- **CO4** (Topo-map Interpretation): Strongly supports **PO2**, **PO3**, **PO4**, and **PO5** as students learn to interpret full topographical maps including natural and human features, making it a capstone skill in geographic analysis.

S.Y.BSc. Geography
Semester- IV (NEP 2020 Pattern)
(With effect from June- 2025)
GG-224 (MIN-5): Practical in Surveying

The complete academic framework based on syllabus for **"Practical in Surveying"**,

5. Programme Outcomes (POs)
6. Course Outcomes (COs)
7. CO-PO Mapping Matrix (with Legend)
8. Brief explanation of Practical in Surveying the CO-PO Mapping

5) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand fundamental concepts, types, and methods of land surveying.
PO2	Acquire technical knowledge and practical skills in traditional and modern surveying techniques.
PO3	Analyze and apply different surveying methods in real-world geographical fieldwork.
PO4	Use spatial tools and measurements (like GPS and Plane Table) for data collection and mapping.
PO5	Conduct fieldwork, interpret data, and present findings in the form of a professional survey report.

6) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Define surveying and explain its types, methods, and relevance in geography.
CO2	Understand and perform Plane Table Survey using proper instruments and methods.
CO3	Explain the components and applications of GPS and conduct GPS-based surveys.
CO4	Apply knowledge through fieldwork (excursion or village survey) and prepare a detailed report.

7) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	1
CO2	2	3	3	3	2
CO3	2	3	3	3	2
CO4	2	2	3	2	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

8) Brief Explanation of CO-PO Mapping

- **CO1** (Introduction to Surveying): Strongly linked with **PO1**, as it covers basic definitions, types, and methods. It moderately supports **PO2**, **PO3**, and **PO4** by providing foundational knowledge.
- **CO2** (Plane Table Survey): Strongly supports **PO2**, **PO3**, and **PO4**, as students gain hands-on experience in manual surveying techniques. Also contributes to **PO5** through field measurements and analysis.
- **CO3** (GPS Survey): Has strong correlations with **PO2**, **PO3**, and **PO4** due to its modern approach to surveying using technology. Moderate contribution to **PO5** as students collect and analyze GPS data.
- **CO4** (Excursion/Village Survey): Strongly supports **PO3** and **PO5** by applying all theoretical and practical knowledge into real-life fieldwork and report writing. It also moderately supports **PO1** and **PO2** through planning and execution.

S.Y.BSc. Geography
Semester- III (NEP 2020 Pattern)
(With effect from June- 2025)
GG-214 (MIN-1): Physical Geography of India

The complete academic framework based on syllabus for **"Physical Geography of India"**,

5. Programme Outcomes (POs)
6. Course Outcomes (COs)
7. CO-PO Mapping Matrix (with Legend)
8. Brief explanation of the CO-PO Mapping

5) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand the fundamental physical geography of India.
PO2	Analyze climate systems, physiographic regions, and drainage patterns.
PO3	Evaluate the distribution and characteristics of soils and vegetation in India.
PO4	Develop skills to interpret physical maps and analyze environmental processes.
PO5	Identify environmental challenges like soil degradation and deforestation and suggest solutions.

6) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Describe the location, extent, and major physiographic divisions of India.
CO2	Explain the climatic characteristics, monsoon system, and rainfall distribution in India.
CO3	Identify and analyze the major river systems and drainage patterns of India.
CO4	Describe types, distribution, and problems associated with soils in India.
CO5	Explain the major types of natural vegetation and assess the causes and effects of deforestation.

7) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5

CO1	3	2		2	1
CO2	2	3		2	2
CO3	3	3		2	2
CO4		2	3	2	3
CO5		2	3	2	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

8) Brief Explanation of CO-PO Mapping

- **CO1** (Physiography): Strongly supports **PO1** as it introduces the foundational physical geography of India. It also contributes to **PO2** (understanding landforms) and **PO4** (map interpretation).
- **CO2** (Climate): Strongly aligns with **PO2** as it covers the monsoon and rainfall systems, crucial in Indian climatology. It also supports **PO4** and **PO5** by fostering environmental analysis and awareness of climatic impacts.
- **CO3** (Drainage): Closely linked to **PO1**, **PO2**, and **PO4**. Understanding river systems enhances comprehension of both natural geography and human settlement patterns. It has moderate relevance to **PO5** due to implications for water resource management.
- **CO4** (Soils): Strongly supports **PO3** and **PO5** through the study of soil types and degradation. It also enhances skills related to **PO4**, such as analyzing soil maps.
- **CO5** (Vegetation and Deforestation): Strongly supports **PO3** and **PO5** through discussion of forest types, ecological zones, and conservation issues. Also ties into **PO4** with vegetation zone mapping and interpretation.

S.Y.BSc. Geography
Semester- IV (NEP 2020 Pattern)
(With effect from June- 2025)
GG-223 (MIN-4): Economic Geography of India

The complete academic framework based on syllabus for **"Economic Geography of India"**,

5. Programme Outcomes (POs)
6. Course Outcomes (COs)
7. CO-PO Mapping Matrix (with Legend)
8. Brief explanation of the CO-PO Mapping

5) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand the geographical and economic importance of agriculture and natural resources.
PO2	Analyze the spatial distribution of resources and industries across India.
PO3	Evaluate the relationship between geography, agriculture, and industrial development.
PO4	Apply geographical knowledge to study regional development and resource planning.
PO5	Understand sustainable practices in agriculture, energy, and industry.

6) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Describe the role and features of Indian agriculture, major crops, and new trends like agro-tourism and agro-forestry.
CO2	Identify and analyze the distribution and production of key natural resources in India.
CO3	Understand the evolution of Indian industries and major industrial developments during the planning era.
CO4	Examine the spatial distribution and characteristics of major industries and industrial regions in India.

7) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	3	3	2	3	2
CO3	2	3	3	2	2
CO4	2	3	3	3	2

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

8) Brief Explanation of CO-PO Mapping

- **CO1** (Indian Agriculture): Has strong correlations with **PO1** (economic importance), **PO3** (link with development), and **PO5** (sustainable practices). It also supports **PO2** and **PO4** through crop distribution and farming types.
- **CO2** (Resources): Strongly supports **PO1**, **PO2**, and **PO4** as students learn the spatial distribution of natural resources like coal, iron, and solar energy. It also links moderately with **PO5**, promoting awareness of sustainable resource use.
- **CO3** (Industry Evolution): Strongly linked to **PO2** and **PO3**, focusing on how geographical factors and planning influenced industrial growth. Also contributes to understanding development (**PO4**) and sustainability (**PO5**).
- **CO4** (Industrial Regions): Strong correlation with **PO2**, **PO3**, and **PO4** as it involves spatial analysis and the role of regions in economic geography. Also moderately supports **PO5** by contextualizing industrial environmental impact.

S.Y.BSc. Geography
Semester- III (NEP 2020 Pattern)
(With effect from June- 2025)
GG-217 (OE): Physical Geography of Maharashtra

Syllabus for **"Physical Geography of Maharashtra"** focusing on the **Geographical Personality, Climate, Drainage, Soil, and Vegetation**, here is a complete academic framework:

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix (with Legend)
4. Brief explanation of Practical in Surveying the CO-PO Mapping

1) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand the physical geography and regional characteristics of Maharashtra.
PO2	Analyze spatial patterns of physiography, climate, rivers, soil, and vegetation.
PO3	Develop map-reading and interpretation skills specific to Maharashtra's geography.
PO4	Apply geographical knowledge to understand regional planning, agriculture, and environmental issues.
PO5	Promote sustainable resource management based on understanding of natural features and climate.

2) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Describe the geographical setting, administrative divisions, and physiographic regions of Maharashtra.
CO2	Explain the climate characteristics and analyze temperature and rainfall patterns across the state.
CO3	Identify major river systems and analyze the drainage pattern of Maharashtra.
CO4	Understand the types, distribution, and importance of soils and forest cover in Maharashtra.

3) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	2	3	2	3	3
CO3	2	3	2	3	2
CO4	2	3	2	3	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

4) Brief Explanation of CO-PO Mapping

- **CO1** (Geographical Personality): Strongly aligned with **PO1** and **PO2** as it introduces Maharashtra's location and physiography. It also supports **PO3** and **PO4** in map understanding and planning context.
- **CO2** (Climate): Strong links to **PO2**, **PO4**, and **PO5** due to climate's influence on agriculture, water management, and sustainability. Also helps with **PO3** through spatial temperature/rainfall mapping.
- **CO3** (Drainage): Strongly supports **PO2** and **PO4**, as rivers are vital for irrigation, settlement, and development. Moderate support to **PO3** and **PO5** for map interpretation and water resource management.
- **CO4** (Soil and Vegetation): Closely tied to **PO2**, **PO4**, and **PO5**, as it addresses environmental geography, land use, and sustainable forest and soil management. Also helps in regional land planning (**PO1**, **PO3**).

S.Y.BSc. Geography
Semester- IV (NEP 2020 Pattern)
(With effect from June- 2025)
GG-225 (OE): Economic Geography of Maharashtra

The complete academic framework based on syllabus for **"Economic Geography of Maharashtra"**,

1. Programme Outcomes (POs)
2. Course Outcomes (COs)
3. CO-PO Mapping Matrix (with Legend)
4. Brief explanation of Practical in Surveying the CO-PO Mapping

1) Programme Outcomes (POs)

PO No.	Programme Outcome Description
PO1	Understand the agricultural and resource-based economic structure of Maharashtra.
PO2	Analyze the distribution and significance of agricultural and mineral resources.
PO3	Evaluate the challenges and prospects in agricultural practices and allied sectors.
PO4	Study the impact of infrastructure development on regional economic growth.
PO5	Promote sustainable development through informed resource management and planning.

2) Course Outcomes (COs)

CO No.	Course Outcome Description
CO1	Explain land use patterns and the role of agriculture in Maharashtra's economy.
CO2	Identify and describe the various types of agriculture and allied activities in Maharashtra.
CO3	Analyze key agricultural challenges and suggest suitable remedial measures.
CO4	Identify the major mineral and energy resources of Maharashtra and their distribution.

CO5	Evaluate the contribution of infrastructure (like Samruddhi Mahamarg) to economic development.

3) CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	1	2
CO2	3	3	3		2
CO3	2	2	3	2	3
CO4	2	3	2	2	3
CO5	1	2	2	3	3

Legend:

- **3** = Strong correlation
- **2** = Moderate correlation
- **1** = Low correlation
- (blank) = No significant correlation

4) Brief Explanation of CO-PO Mapping

- **CO1** (Land Use & Agricultural Role): Strongly aligns with **PO1** and moderately supports **PO2** and **PO3**, as students explore how agriculture shapes Maharashtra's economy and land use.
- **CO2** (Types of Agriculture & Allied Activities): Strongly linked to **PO1**, **PO2**, and **PO3**, offering detailed insights into regional agricultural diversity and practices.
- **CO3** (Problems & Remedial Measures): Strongly supports **PO3** and **PO5**, promoting awareness of sustainable solutions for agricultural issues. It also links with **PO2** and **PO4** due to environmental and socio-economic implications.
- **CO4** (Resources Distribution): Tightly connected to **PO2**, **PO4**, and **PO5**, as resource management is key for sustainable and strategic development planning.
- **CO5** (Samruddhi Mahamarg & Economic Development): Strongly aligned with **PO4** and **PO5**, encouraging students to understand how modern infrastructure projects can impact regional economies.

S.Y.B.Sc. Geography
Semester- III (NEP-2020 Pattern) WEF June - 2025
GG-216 (MIN-3): Practical in SOI Topographical Maps

Programme Outcomes (POs)

PO Code	Programme Outcome Statement
PO1	Acquire foundational knowledge of map reading and physical geography.
PO2	Develop technical skills in using topographical maps and map symbols.
PO3	Apply cartographic methods to analyze relief features and landforms.
PO4	Interpret natural and human-made features using SOI topo maps.
PO5	Enhance observation and analytical abilities for geographical field interpretation.

Course Outcomes (COs)

CO Code	Course Outcome Statement
CO1	Define and understand the concept and significance of relief.
CO2	Identify and apply quantitative and qualitative methods of relief representation.
CO3	Interpret various landforms and slopes using contour representation.
CO4	Understand the structure and indexing system of SOI toposheets, symbols, and grid references.
CO5	Interpret topographical maps to analyze physical and human features of different terrains.

CO-PO Mapping Matrix –

COs \ POs	PO1 (Knowledge)	PO2 (Skills)	PO3 (Application)	PO4 (Topo-Interpretation)	PO5 (Analytical Ability)
CO1	3	2	1	1	1

CO2	3	3	3	2	2
CO3	3	3	3	2	3
CO4	3	3	2	3	2
CO5	3	3	3	3	3

Legend: Scale of Contribution

Score	Level of Correlation
3	Strong Contribution
2	Moderate Contribution
1	Low Contribution
0	No Contribution

Interpretation of CO-PO Mapping

The course provides a **comprehensive skillset** in representing and interpreting topographical features:

- **CO1** lays the conceptual foundation of relief, moderately supporting theoretical understanding (PO1).
- **CO2 and CO3** emphasize **contour reading** and various **relief representation techniques**, linking strongly with technical and application skills (PO2, PO3, PO5).
- **CO4** builds competence in using **Survey of India toposheets**, map indexing, and symbols, aligning well with interpretation-based PO4.
- **CO5** is the most integrative, combining **analysis of physical and cultural landscapes** through topographic interpretation, contributing strongly to all POs.

PO–CO Mapping Report

S.Y.B.A Urdu Special – Semester 2
Paper Title: Ghazal

Course Outcomes (Cos)CO Code	Course Outcome Description
CO1	To impart the basic idea and knowledge about Urdu Ghazal.
CO2	To make students understand the various kinds of Urdu Ghazal
CO3	To enable students to grasp content of each extract from Urdu Ghazal.

Program Outcomes (POs)

PO Code	Program Outcome Description
PO1	Basic understanding of Urdu poetic forms and their development.
PO2	Ability to critically appreciate poetic content and style.
PO3	Understanding of social, cultural, and philosophical themes through Ghazal.
PO4	Development of analytical thinking and interpretation skills
PO5	Enhancement of reading comprehension and literary appreciation of Urdu Ghazal

PO–CO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO 1	3	2	2	1	3
CO 2	3	3	3	2	3
CO 3	2	3	3	3	3

Interpretation of PO–CO Mapping

CO1 (Basic Idea of Urdu Ghazal): Strongly aligns with PO1 and PO5 by providing foundational knowledge and enhancing appreciation, with moderate impact on PO2, PO3, and low contribution to analytical skills PO4.

CO2 (Kinds of Ghazal): Strongly supports PO1, PO2, PO3, and PO5 by teaching various forms and themes of Ghazal, moderately linked to PO4 through understanding stylistic variations.

CO3 (Grasping Content): Strongly contributes to PO2, PO3, PO4, and PO5 by enabling comprehension of selected extracts and their deeper meanings, moderately aligns with PO1.

📄 PO–CO Mapping Report

S.Y.B.A Urdu Special - Semester 1
Title: Drama Nigari

Paper

✅ Course Outcomes (COs)

CO Code	Course Outcome Description
CO1	To acquaint students with the literature of Urdu.
CO2	To impart basic ideas of drama.
CO3	To teach and provide the knowledge about the kinds of drama.
CO4	To create social awareness among students through drama.

CO5	To introduce and enable the creativity of drama.

✅ Program Outcomes (POs)

PO Code	Program Outcome Description
PO1	Basic understanding of Urdu literature and its various genres.

PO Code	Program Outcome Description
PO2	Development of analytical skills through dramatic texts.
PO3	Ability to comprehend dramatic structure and performance aspects.
PO4	Enhancement of communication, expression, and presentation skills.
PO5	Appreciation of socio-cultural themes through Urdu drama.

✅ PO–CO Mapping Matrix

Scale: 3 = Strong, 2 = Moderate, 1 = Low

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	2
CO2	2	3	3	2	3
CO3	2	3	3	2	3
CO4	2	2	2	3	3
CO5	2	2	2	3	3

Interpretation of PO–CO Mapping

- **CO1 (Acquaintance with Urdu Literature):** Strongly supports **PO1** by introducing students to Urdu literary works, moderately contributes to **PO2** and **PO5** by giving exposure to cultural aspects, and has a basic role in **PO3** and **PO4**.
- **CO2 (Basic Ideas of Drama):** Strong alignment with **PO2**, **PO3**, and **PO5**, enabling students to understand fundamental dramatic concepts while improving interpretative and cultural appreciation skills; moderately improves communication under **PO4**.
- **CO3 (Kinds of Drama):** Strongly supports **PO2**, **PO3**, and **PO5** by providing knowledge of dramatic forms and performance, and moderately enhances **PO4** through classroom activities.
- **CO4 (Social Awareness):** Focuses on **PO4** and **PO5**, encouraging students to engage with social issues and improve expression skills through drama; moderately connected with **PO1**, **PO2**, and **PO3**.
- **CO5 (Creativity in Drama):** Strongly contributes to **PO4** and **PO5** by fostering creativity, dramatic expression, and social reflection; moderately supports basic literary understanding (**PO1**) and analytical abilities (**PO2**, **PO3**).

PO–CO Mapping Report
S.Y.B.A Urdu Special -2 Semester 2
Paper Title: Marsiya & Rubai Course Outcomes (Cos)

CO Code	Course Outcome Description
CO1	To impart the basic idea and knowledge about Urdu Marsiya & Rubai.
CO2	To make students understand the various kinds of Urdu Marsiya & Rubai
CO3	To enable students to grasp content of each extract from Urdu Marsiya & Rubai

Program Outcomes (POs)

PO Code	Program Outcome Description
PO1	Basic understanding of Urdu poetry, especially Marsiya and Rubai, and their evolution
PO2	Development of literary and poetic analysis skills
PO3	Ability to understand historical, cultural, and emotional aspects of Marsiya and Rubai.
PO4	Enhancement of reading, interpretation, and expression skills.
PO5	Appreciation of classical poetic forms and their relevance in contemporary literature.

PO–CO Mapping Matrix
Scale: 3 = Strong, 2 = Moderate, 1 = Low

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	1	3
CO2	3	3	3	2	3
CO3	2	3	3	3	3

✅ Interpretation of PO–CO Mapping

CO1 (Basic Idea of Marsiya & Rubai): Strongly supports PO1 and PO5 by providing essential knowledge of classical poetic forms, moderately aligned with PO2, PO3, and minimally improves interpretation skills PO4.

CO2 (Kinds of Marsiya & Rubai): Strongly aligned with PO1, PO2, PO3, and PO5, helping students understand various styles and themes in Marsiya and Rubai, with moderate contribution to interpretative skills PO4.

CO3 (Grasping Extracts): Strong contribution to PO2, PO3, PO4, and PO5 by enabling analytical thinking, content comprehension, and appreciation of literary depth, moderately connected with PO1.

✅Summary:

This mapping helps ensure that through the study of Marsiya and Rubai, students not only gain knowledge but also develop analytical, interpretative, and cultural appreciation skills.

✅ CO–PO Mapping Report

F.Y.B.A Urdu General – Semester 1st s 2nd Paper
Title: Semester 1st – Inshaiyya Nigari Paper Title:
Semester 2nd – Khaka Nigari

✅ Course Outcomes (COs):

CO Code	Course Outcome Description
CO1	To acquaint the students with the important genre of Urdu prose: Inshaiyya and Khaka.
CO2	To acquaint the students with the style and characteristics of the genre of Urdu prose: Inshaiyya and Khaka.
CO3	To acquaint the students with the history of the emergence of Inshaiyya Nigari and Khaka Nigari in Urdu literature.
CO4	To study the works of important and selected Inshaiyya Nigar and Khaka Nigar in Urdu.

✅ Program Outcomes (POs):

PO Code	Program Outcome Description
PO1	Understanding the basic genres of Urdu prose literature.
PO2	Development of literary appreciation, especially prose writing styles.
PO3	Familiarity with historical evolution and significance of Urdu Inshaiyya and Khaka.
PO4	Analytical and interpretative skills through the study of Urdu prose writers.
PO5	Enhancement of writing skills and creative expression through prose learning.

✅ PO–CO Mapping Matrix:

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	2	3	2	2	3
CO3	3	2	3	2	2
CO4	2	3	3	3	3

✅ Interpretation of PO–CO Mapping:

- **CO1 (Introduction to Genres):** Strongly aligned with PO1 and PO2, providing a fundamental understanding of prose forms with moderate impact on PO3, PO4, PO5.
- **CO2 (Style and Characteristics):** Strongly supports PO2 and PO5, focusing on prose writing styles and creative expression, with moderate alignment to PO1, PO3, PO4.
- **CO3 (Historical Perspective):** Strong connection to PO1 and PO3, acquainting students
- ith the evolution of Inshaiyya and Khaka, with supportive links to PO2, PO4, PO5.

- **CO4 (Study of Writers):** Strongly contributes to PO2, PO3, PO4, PO5 by enhancing knowledge of Urdu prose writers and promoting analytical abilities.

PO–CO Mapping Report

T.Y.B.A Urdu Special - 3, Semester

2 Paper Title: Urdu Adab ki Tahrikat

Course Outcomes (COs)

CO Code	Course Outcome Description
CO1	To impart a basic idea about the Urdu language and literature.
CO2	To enable students to understand various forms of prose literature.
CO3	To enable students to study different literary movements in Urdu literature.
CO4	To develop analytical skills to critically analyze literary movements and trends.

Program Outcomes (POs)

PO Code	Program Outcome Description
PO1	Broad understanding of Urdu language, literature, and cultural heritage.
PO2	Development of analytical and critical thinking through literary studies.
PO3	Ability to understand and interpret literary texts in socio-historical contexts.
PO4	Effective communication and academic writing in Urdu.
PO5	Appreciation of literary movements and genres in Urdu literature.

PO–CO Mapping Matrix

Scale: 3 = Strong, 2 = Moderate, 1 = Low

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	1	2
CO2	2	3	2	2	3
CO3	3	2	3	1	3
CO4	2	3	3	2	3

Interpretation of PO–CO Mapping

• CO1 (Intro to Language & Literature) strongly supports PO1 (core understanding of Urdu language and literature) and moderately contributes to PO2, PO3, and PO5 by laying the foundation of literary knowledge.

• CO2 (Forms of Prose) strengthens PO2 (analytical and critical thinking) and PO5 (understanding genres), and supports PO3 and PO4 through reading and interpreting prose.

• CO3 (Literary Movements) is strongly aligned with PO1, PO3, and PO5, helping students understand literary trends in historical and cultural contexts.

• CO4 (Critical Analysis) has a strong relation to PO2, PO3, and PO5, as it develops students' abilities to analyze movements with depth, and supports PO4 by improving academic writing and discussion skills.

PO–CO Mapping Report

T.Y.B.A Urdu Special - 3, Semester 1

Paper Title: Sir Sayyed Ahmad Khan

Course Outcomes (COs) CO Code	Course Outcome Description
CO1	To improve the understanding of the educational contributions of Sir Sayyed Ahmad Khan among the Muslim community.
CO2	To enable students to understand various forms of education promoted by Sir Sayyed.
CO3	To impart knowledge of Western thought introduced through Sir Sayyed Ahmad Khan's educational reforms.
CO4	To understand and appreciate the contribution of Sir Sayyed Ahmad Khan and his associates to Urdu literature.

Program Outcomes (POs) PO Code	
PO 1	Broad understanding of Urdu language, literature, and cultural heritage.
PO 2	

PO 3	
PO 4	
PO 5	

PO–CO Mapping Matrix

Scale: 3 = Strong, 2 = Moderate, 1 = Low

CO \ PO	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	2	3	1	3
CO 2	2	3	3	2	3
CO 3	2	3	3	2	2
CO 4	3	2	2	2	3

Interpretation of PO–CO Mapping

• CO1 (Contribution to Education) strongly supports PO1, PO3, and PO5 by enhancing the understanding of Sir Sayyed's educational mission and its cultural significance, with moderate impact on critical thinking (PO2) and basic writing skills (PO4).

• CO2 (Forms of Education) strengthens PO2 and PO3 by helping students critically analyze different educational models introduced by Sir Sayyed, and contributes to PO5 (understanding reform movements), with moderate support to PO1 and PO4.

• CO3 (Western Thought) focuses on PO2 and PO3, offering students insights into modern educational influences; it also builds moderate skills in PO1, PO4, and PO5.

• CO4 (Contribution to Literature) is strongly aligned with PO1 and PO5, emphasizing Sir Sayyed's literary significance, while offering moderate development in PO2, PO3, and PO4 for critical and writing skills.

PO–CO Mapping Report

T.Y.B.A Urdu Special - 4, Semester 1

Paper Title: Tanqeed

Course Outcomes (COs)

CO Code	Course Outcome Description
CO1	To impart knowledge about the history of the Urdu language and its literature.
CO2	To enable students to understand the contribution of Fort William College to the development of the Urdu language and its literature.
CO3	To impart the significance of criticism in Urdu literature and explain its various forms.

Program Outcomes (POs)

PO Code	Program Outcome Description
PO1	Broad understanding of Urdu language, literature, and cultural heritage.
PO2	Development of analytical and critical thinking through literary and historical studies.
PO3	Ability to understand and interpret literary texts in socio-historical and educational contexts.
PO4	Effective communication and academic writing in Urdu.
PO5	Appreciation of criticism and literary traditions in Urdu literature.

PO–CO Mapping Matrix

Scale: 3 = Strong, 2 = Moderate, 1 = Low

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	1	2
CO2	3	2	3	1	2
CO3	2	3	3	2	3

Interpretation of PO–CO Mapping

• CO1 (History of Urdu Language & Literature) strongly supports PO1 and PO3 by building foundational knowledge of the Urdu language and its literary heritage. It moderately contributes to PO2 and PO5, and minimally to PO4.

• CO2 (Contribution of Fort William College) strengthens PO1 and PO3, offering historical and educational perspectives of literary development, while moderately enhancing PO2 and PO5.

• CO3 (Significance of Criticism) is strongly aligned with PO2, PO3, and PO5, fostering critical thinking skills and appreciation of criticism in Urdu literature, and moderately supports PO4 by improving writing skills.

PO–CO Mapping Report

T.Y.B.A Urdu Special - 4, Semester 2

Paper Title: Quratul-Ain Hyder

Course Outcomes (COs) CO Code	Course Outcome Description
CO1	
	To study Quratul-Ain Hyder as a short story and novel writer, focusing on her significant contribution to Urdu literature, exploration of complex themes, and distinct narrative style.
CO2	To enable students to appreciate South Asian history, culture, and literature through her works, and develop critical skills in literary analysis and cultural interpretation.

Program Outcomes (POs)

PO Code	Program Outcome Description
PO1	Broad understanding of Urdu language, literature, and cultural heritage.
PO2	Development of analytical and critical thinking through literary and cultural studies.
PO3	Ability to understand and interpret literary texts in socio-historical and cultural contexts.
PO4	Effective communication and academic writing in Urdu.
PO5	Appreciation of modern Urdu fiction and narrative styles.

PO–CO Mapping Matrix

Scale: 3 = Strong, 2 = Moderate, 1 = Low

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	2	3	3	2	3

Interpretation of PO–CO Mapping

• CO1 (Study of Quratul-Ain Hyder's Works) strongly supports PO1, PO3, and PO5 by enhancing understanding of Urdu literature, cultural heritage, and narrative styles. It moderately contributes to PO2 and PO4 through the development of critical and writing skills.

• CO2 (Appreciation of History, Culture, and Literary Analysis) is strongly aligned with PO2, PO3, and PO5 by cultivating analytical skills and cultural interpretation, and offers moderate support to PO1 and PO4.

S.Y.B.A

DSC-7 | HIN-211 | व्यंग्य तरंग (Third Semester)

1. Course Outcomes (COs)

Based directly on the **उद्देश्य** and **उपादेयता** given in the image:

CO1: छात्र हिंदी साहित्य की व्यंग्य विधा की प्रकृति, स्वरूप और विकास को समझ सकेंगे।

CO2: छात्र प्रमुख हिंदी व्यंग्यकारों और उनकी रचनाओं से परिचित होंगे।

CO3: छात्र व्यंग्य रचनाओं के माध्यम से मानवीय मूल्यों की पहचान और व्याख्या कर सकेंगे।

CO4: छात्र व्यंग्य साहित्य में निहित सामाजिक समस्याओं और संवेदनाओं का आलोचनात्मक विश्लेषण कर सकेंगे।

CO5: छात्र पाठ्य सामग्री के आधार पर विचार व्यक्त करने और व्याख्यात्मक लेखन की क्षमता विकसित करेंगे।

2. Programme Outcomes (Pos)

PO1: विषय ज्ञान (Disciplinary Knowledge)

PO2: आलोचनात्मक एवं विश्लेषणात्मक चिंतन

PO3: संप्रेषण कौशल (Communication Skills)

PO4: नैतिकता एवं मानवीय मूल्य

PO5: सामाजिक उत्तरदायित्व और संवेदनशीलता

PO6: आजीवन सीखने की क्षमता

3. CO–PO Mapping Table

(Scale: 3 = Strong, 2 = Moderate, 1 = Low)

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	–	–	1
CO2	3	1	1	–	–	1
CO3	2	2	1	3	2	1

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6
CO4	2	3	2	2	3	1
CO5	1	2	3	1	1	2

तृतीय सत्र

DSC-7 : HIN-211 — व्यंग्य तरंग

श्रेयांक : 02

अंक : 50

आंतरिक मूल्यांकन : 20

बाह्य मूल्यांकन : 30

पाठ्यक्रम का उद्देश्य –

1. **छात्रों को साहित्य की व्यंग्य विधा से परिचित कराना।**
2. **छात्रों को हिंदी व्यंग्यकारों से परिचित कराना।**
3. **हिंदी व्यंग्य रचनाओं के माध्यम से छात्रों में मानवीय मूल्यों के प्रति आस्था का निर्माण करना।**
4. **व्यंग्य रचनाओं के माध्यम से छात्रों में सामाजिक संवेदनाओं को जागृत करना।**

पाठ्यक्रम की उपादेयता –

1. **छात्र साहित्य की व्यंग्य विधा से परिचित हुए।**
2. **हिंदी व्यंग्यकारों से छात्र परिचित हुए।**
3. **छात्रों में मानवीय मूल्यों के प्रति आस्था का निर्माण हुआ।**
4. **छात्रों में सामाजिक संवेदना का निर्माण हुआ।**

Course Outcomes (COs)

इस पाठ्यक्रम के अध्ययन के बाद छात्र:

CO1: हिंदी साहित्य की व्यंग्य विधा की प्रकृति, स्वरूप और विकास को समझ सकेंगे।

CO2: प्रमुख हिंदी व्यंग्यकारों और उनकी रचनाओं से परिचित होंगे।

CO3: व्यंग्य रचनाओं के माध्यम से सामाजिक समस्याओं और मानवीय मूल्यों का विश्लेषण कर सकेंगे।

CO4: साहित्यिक पाठ के प्रति आलोचनात्मक दृष्टि और संवेदनशील सोच विकसित कर सकेंगे।

CO5: व्यंग्य साहित्य के सामाजिक प्रभाव को समकालीन संदर्भों में समझ सकेंगे।

Programme Outcomes (POs)

(UG स्तर, कला संकाय के लिए सामान्य रूप से स्वीकार्य)

PO1: विषय संबंधी मूलभूत ज्ञान और अवधारणाओं की समझ।

PO2: विश्लेषणात्मक और आलोचनात्मक चिंतन क्षमता का विकास।

PO3: सामाजिक, सांस्कृतिक और नैतिक मूल्यों की समझ।

PO4: प्रभावी संप्रेषण कौशल (मौखिक एवं लिखित)।

PO5: आजीवन सीखने और आत्म-विकास की प्रवृत्ति।

PO6: सामाजिक उत्तरदायित्व और नागरिक चेतना का विकास।

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	–	–	–
CO2	3	1	2	1	–	–
CO3	2	3	3	1	–	2
CO4	1	3	2	2	2	–
CO5	1	2	3	1	2	3

- **CO1** और **CO2** से छात्रों को व्यंग्य विधा और व्यंग्यकारों का बुनियादी ज्ञान मिलता है, जो **PO1** को सशक्त करता है।
- **CO3** और **CO4** के माध्यम से आलोचनात्मक सोच, सामाजिक विश्लेषण और मूल्य-बोध विकसित होता है, जो **PO2** और **PO3** से सीधे जुड़ा है।
- व्यंग्य साहित्य पर चर्चा, उत्तर लेखन और प्रस्तुतीकरण से **PO4 (Communication Skills)** विकसित होती हैं।
- सामाजिक चेतना और समकालीन संदर्भों की समझ **PO6** को मजबूती देती है।

DSC- 8 HIN -212 उपन्यास विधा-नौकर की कमीज

श्रेयांक - 04 अंतर्गत मूल्यांकन - 40
अंक - 100 बाह्य मूल्यांकन - 60

पाठ्यक्रम के उद्देश्य -

1. छात्रों को उपन्यास की अवधारणा एवं स्वरूप से अवगत कराना ।
2. उपन्यास के विकासात्मक चरणों का विस्तार से अध्ययन करना ।
3. उपन्यास के प्रकारों एवं तत्वों को समझाना ।
4. हिंदी साहित्य की प्रसिध्द औपन्यासिक रचना का अध्ययन करवाना।

पाठ्यक्रम की उपादेयता -

1. छात्रों ने उपन्यास की अवधारणा एवं स्वरूप का अध्ययन किया ।
2. उपन्यास के विकासात्मक चरणों का विस्तार से अध्ययन किया।
3. छात्र उपन्यास के प्रकार एवं तत्वों से परिचित हुए ।
4. छात्रों ने हिंदी साहित्य की प्रसिध्द औपन्यासिक रचना का अध्ययन किया ।

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	2	1
CO2	3	2	1	2	2
CO3	2	3	1	2	3

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO4	2	3	2	3	3

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Become familiar with Indian Sant poetry.
CO2: Understand the Indian Sant poetry tradition and its background.
CO3: Develop faith in human values through Sant poetry.
CO4: Gain knowledge of the richness and significance of the Sant poetry tradition.

Programme Outcomes (POs) – Humanities

PO1: Disciplinary knowledge
PO2: Critical and reflective thinking
PO3: Ethical and human values
PO4: Cultural awareness
PO5: Interpretative and analytical skills

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	1	2	3	1
CO2	3	2	2	3	2
CO3	1	2	3	2	1
CO4	2	2	2	3	2

OE–3 (HIN-215): Hindi Gadya Rachnayein – 1 (Gadya Gatha)

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Become familiar with different forms of Hindi prose.
CO2: Develop social awareness through Hindi prose writings.
CO3: Understand and internalize human values presented in prose literature.
CO4: Develop interest and appreciation for literature.

Programme Outcomes (POs) – Generic (Arts/Humanities)

PO1: Disciplinary knowledge
PO2: Critical and reflective thinking
PO3: Ethical and social responsibility
PO4: Cultural and literary awareness
PO5: Communication and interpretative skills

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	1	1	2	2
CO2	2	2	3	2	1
CO3	1	2	3	2	1
CO4	1	2	1	3	2

(HIN-214): Prayojanmoolak Hindi.

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Understand the meaning and correct usage of idioms in sentences through word study.
CO2: Become familiar with the art of editing.
CO3: Use Hindi language effectively in audio and visual communication media.
CO4: Gain basic knowledge of print media, précis writing, and paraphrasing.

Programme Outcomes (POs) – Arts/Humanities

PO1: Disciplinary and language knowledge
PO2: Communication skills
PO3: Professional and practical skills
PO4: Media and digital literacy
PO5: Analytical and applied language skills

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	2
CO2	2	2	3	2	2
CO3	2	3	3	3	2
CO4	2	2	3	2	3

CO–PO Mapping Justification (Brief)

- **CO1 builds a strong foundation in language and word usage.**

- **CO2 and CO4 emphasize professional, applied, and analytical skills required in editing and print media.**
- **CO3 has high alignment with communication, media, and practical language application.**

MIN-1A (HIN-214): Kahani Vidha – Kathasar.

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Understand the theoretical nature and form of the short story.
CO2: Develop social values through the study of short stories.
CO3: Enhance literary thinking and imaginative ability through story analysis.

Programme Outcomes (POs) – Arts / Humanities

PO1: Disciplinary knowledge
PO2: Critical and creative thinking
PO3: Ethical and social values
PO4: Cultural and literary awareness
PO5: Interpretative and analytical skills

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	2	2
CO2	1	2	3	2	1
CO3	2	3	2	2	3

CO–PO Mapping Justification (Brief)

- **CO1 strongly supports disciplinary knowledge of the short story as a literary genre.**
- **CO2 is closely linked with ethical and social values, as stories reflect social realities.**
- **CO3 has high alignment with critical, creative, and analytical skills through interpretation and imagination.**

AEC-3 MIL (HIN-218): Sahitya Shikhar – 1.

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Become familiar with various literary genres.
CO2: Develop faith in life values through literature.
CO3: Build social sensitivity through different literary works.
CO4: Develop expressive ability and creative skills.
CO5: Understand the practical usefulness of language through activities.

Programme Outcomes (POs) – Arts / Humanities

PO1: Disciplinary knowledge
PO2: Communication and expression skills
PO3: Ethical and life values
PO4: Social and cultural awareness
PO5: Practical and applied language skills

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	1	1	2	1
CO2	1	1	3	2	1
CO3	1	1	2	3	1
CO4	1	3	1	2	2
CO5	1	2	1	1	3

CO–PO Mapping Justification (Brief)

- **CO1 strengthens basic literary knowledge of different genres.**
- **CO2 and CO3 strongly support life values and social sensitivity, which are core aims of the course.**
- **CO4 focuses on expression and communication skills through literature.**
- **CO5 emphasizes practical language use through activity-based learning.**

SEC–1 (HIN-217): Anuvaad Vigyan

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Understand the techniques and process of translation studies.
CO2: Explain the theoretical analysis of translation science.
CO3: Apply translation skills in literary and practical translation work.

Programme Outcomes (POs) – Arts / Humanities

PO1: Disciplinary knowledge
PO2: Communication and language proficiency
PO3: Professional and skill-based competence
PO4: Analytical and critical thinking
PO5: Practical and applied language skills

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	1
CO2	3	1	1	3	1
CO3	2	3	3	2	3

VEC–1 (HIN-216): Hindi Vyakaran.

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Understand the meaning, nature, and types of language.
CO2: Identify Hindi sounds and the varnamala correctly.
CO3: Understand basic concepts of Hindi grammar, including sentence structure and word formation.
CO4: Develop writing skills through essay writing and self-expression.

Programme Outcomes (POs) – Arts / Humanities

PO1: Disciplinary and language knowledge
PO2: Communication and writing skills
PO3: Analytical and logical thinking
PO4: Linguistic accuracy and language proficiency
PO5: Practical application of language skills

CO–PO Mapping Table

(1 = Low, 2 = Moderate, 3 = High)

Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	1	2	2	1
CO2	2	1	1	3	1
CO3	3	2	3	3	2
CO4	2	3	2	2	3

CO–PO Mapping Justification (Brief)

- **CO1 provides foundational language knowledge and conceptual clarity.**

- **CO2 strongly supports linguistic accuracy through phonetics and varnamala.**
- **CO3 develops analytical understanding of grammar and structure.**
- **CO4 has high alignment with writing, communication, and practical language use.**

T.Y.B.A History

Course Objectives: History of India (1526–1707)

1. **Help students understand the political transformation of early modern India** by studying the foundation, expansion, and consolidation of the Mughal Empire.
2. **Introduce key rulers and administrative systems** of the Mughal period, with attention to their policies, institutions, revenue systems, and military strategies.
3. **Examine major social, economic, and cultural developments** including art, architecture, literature, religion, and patterns of daily life under Mughal rule.
4. **Explore regional powers and resistance movements** to understand how various kingdoms, communities, and local authorities interacted with the Mughal state.
5. **Develop critical awareness of primary and secondary historical sources** related to the period and train students to interpret them in context.
6. **Encourage analytical thinking about continuity and change** in political, social, and cultural structures between the 16th and 18th centuries.
7. **Enable students to connect the Mughal period with broader historical processes** such as early modern state formation, trade expansion, and encounters with European powers.
8. **Strengthen historical skills** like comparison, argumentation, and evidence-based reasoning, preparing students for advanced study in history

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Explain the major political events from the rise of the Mughals to the end of Aurangzeb's reign.
CO2: Describe the administrative structure of the Mughal Empire, including revenue, military, and judicial systems.
CO3: Discuss the social, cultural, and economic life of early modern India, with examples from art, architecture, literature, and trade.
CO4: Examine the role of important rulers and regional powers and assess their impact on the evolution of the Mughal state.

CO5: Analyze historical sources related to the period and develop evidence-based historical arguments.
CO6: Compare political and cultural changes across the 16th to 18th centuries and relate them to wider historical trends.

Programme Specific Outcomes (PSOs)

PSO1: Understand major historical developments in India and the world.
PSO2: Interpret historical events using evidence and critical thinking.
PSO3: Appreciate cultural diversity, heritage, and socio-political processes.
PSO4: Apply historical knowledge to academic writing, fieldwork, and competitive examinations.

PSO – CO Mapping

COs / PSOs	PSO1	PSO2	PSO3	PSO4
CO1	✔	✔		
CO2	✔	✔		✔
CO3	✔		✔	
CO4	✔	✔	✔	
CO5		✔		✔
CO6	✔	✔	✔	

Course- Making of Contemporary India – II

PO1. Build a foundational understanding of major historical developments in India.
PO2. Develop critical thinking and analytical skills for interpreting historical events.
PO3. Apply historical methods such as source analysis, comparison and contextualisation.
PO4. Strengthen communication skills through historical writing and discussion.
PO5. Promote civic awareness, tolerance and appreciation of India's cultural and political heritage.

PSO1: Understand major political, economic, and social developments in modern and contemporary India.
PSO2: Analyse historical events using evidence and critical thinking.
PSO3: Explain how historical processes shape present-day society, governance, and institutions.
PSO4: Apply historical understanding in academic writing, civic awareness, and competitive examinations.

After completing the course, students will be able to:

CO1: Describe major political developments in India after independence, including nation-building, constitutional evolution, and key reforms.

CO2: Explain economic changes such as planning, liberalisation, agricultural policies, and industrial growth.

CO3: Discuss social issues and movements related to caste, gender, labour, tribes, environment, and human rights.

CO4: Understand India's foreign policy, regional relations, and major global engagements.

CO5: Examine contemporary challenges such as communalism, regionalism, corruption, inequality, and development gaps.

CO6: Analyse government policies, institutional changes, and current events with historical context.

Course: Making of Contemporary India – II

COs / PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1

COs / PSOs	PSO1	PSO2	PSO3	PSO4
CO2	3	3	2	3
CO3	3	2	3	1
CO4	3	3	3	3
CO5	3	3	3	2
CO6	3	3	3	3

Course: ***An Introduction to Museums in India***

Programme Outcomes (POs)

PO1: Understand major historical developments and interpret them critically.
PO2: Develop analytical skills and evaluate different types of historical sources.
PO3: Gain awareness of India's socio-cultural, political and heritage traditions.
PO4: Improve communication skills through writing, presentation and discussion.
PO5: Build research aptitude and use evidence-based reasoning.
PO6: Develop responsible citizenship, heritage consciousness and ethical thinking.

Course Outcomes (COs)

O1: Explain the meaning, nature and functions of museums.
CO2: Describe the historical development of museums in India.
CO3: Identify different types of museums and their roles in education and society.
CO4: Understand museum administration, collection, preservation and documentation.
CO5: Recognise the importance of conservation, care of objects and preventive measures.
CO6: Discuss major museums of India and their contributions to heritage protection.

PO–CO Mapping (Numeric Table)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2	1	1	2
CO2	2	2	2	1	1	2
CO3	2	2	3	2	1	3
CO4	2	3	2	2	2	2
CO5	1	3	2	1	2	2
CO6	2	2	3	2	1	3

Course: History of India, 1750–1857

PO1. Build a foundational understanding of major historical developments in India.
PO2. Develop critical thinking and analytical skills for interpreting historical events.
PO3. Apply historical methods such as source analysis, comparison and contextualisation.
PO4. Strengthen communication skills through historical writing and discussion.
PO5. Promote civic awareness, tolerance and appreciation of India's cultural and political heritage.

CO1. Explain the political conditions of mid-18th century India and the decline of the Mughal Empire.
CO2. Analyse the expansion of British power through wars, diplomacy and administration.
CO3. Describe major socio-economic changes introduced under British rule.
CO4. Evaluate key reform movements and their role in shaping Indian society.
CO5. Assess the causes, events and consequences of the Revolt of 1857.
CO6. Interpret historical developments using maps, timelines and primary sources.

CO–PO Mapping (Numbers

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	2
CO2	3	3	2	1	2
CO3	2	3	2	1	2
CO4	2	3	1	2	3
CO5	3	3	2	1	3
CO6	2	3	3	2	2

Course- History of Modern Europe (1914 A.D to 1945)

PO1. Understand major historical developments and global transformations.
PO2. Build analytical skills for interpreting political, social and economic changes.
PO3. Use historical methods including comparison, source analysis and chronology.
PO4. Communicate historical ideas clearly in written and oral formats.
PO5. Develop a broader global outlook and appreciation of democratic values.

Course Outcomes (COs)

Course: History of Modern Europe, 1914–1945

CO1. Explain the causes, nature and consequences of the First World War.
CO2. Analyse the peace settlements and the interwar political developments.
CO3. Describe the rise of totalitarian regimes in Europe.
CO4. Examine economic crises and their impact on European society.
CO5. Discuss the origins, course and impact of the Second World War.
CO6. Interpret major events of the period using maps, timelines and relevant sources.

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	1	2
CO2	3	3	2	1	2
CO3	2	3	2	1	3
CO4	2	3	1	1	2
CO5	3	3	2	1	3
CO6	2	3	3	2	2

S.Y.B.A

Course-An Introduction to Archives in India

PO1. Build a broad understanding of historical knowledge and heritage sources.
PO2. Develop analytical and interpretive skills for studying historical records.
PO3. Apply historical methods such as documentation, verification and comparison.
PO4. Strengthen written and oral communication through historical explanation.
PO5. Promote appreciation for preservation, cultural responsibility and ethical use of sources.

Course Outcomes (COs)

CO1. Explain the concept, nature and significance of archives.
CO2. Describe the history and development of archival institutions in India.
CO3. Identify different types of archives and their functions.
CO4. Understand the methods of acquisition, classification and preservation of archival materials.
CO5. Examine the role of national and state archival institutions in historical research.
CO6. Apply basic archival skills such as cataloguing, referencing and handling documents.

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	2
CO2	3	3	2	1	2
CO3	2	3	2	1	2
CO4	2	3	3	1	3
CO5	3	3	2	1	3
CO6	2	3	3	2	2

Course: *History of Ancient India (600 A.D. to 1206 A.D.)*

Programme Outcomes (POs)

PO1: Understand major historical developments and interpret them critically.
PO2: Develop analytical skills and the ability to evaluate historical sources.
PO3: Gain awareness of India's socio-cultural, political and economic evolution.
PO4: Improve communication skills through historical writing and discussion.
PO5: Build research aptitude and use evidence-based reasoning.
PO6: Cultivate responsible citizenship, heritage awareness and ethical thinking.

Course Outcomes (COs)

CO1: Explain the political developments from Harsha to the rise of regional kingdoms.
CO2: Describe the administrative systems, economic patterns and cultural trends of the period.
CO3: Analyse the emergence of Rajput power and regional states in early medieval India.
CO4: Understand religious movements, temple culture, art, architecture and literature.
CO5: Evaluate the political changes leading to Turkish invasions and the foundation of the Delhi Sultanate.
CO6: Interpret primary and secondary historical sources related to the early medieval period.

PO–CO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	2	1	2
CO2	2	3	3	2	2	2
CO3	3	3	3	2	2	2
CO4	2	2	3	2	1	3
CO5	3	3	3	2	3	2
CO6	2	3	2	2	3	2

Course- History of the United States of America (A.D. 1776–1945)

Programme Outcomes (POs)

PO1: Acquire knowledge of major historical events, processes, and institutions at national and global levels.
PO2: Understand political, social, economic, and cultural transformations over time.
PO3: Develop critical thinking and analytical ability through historical interpretation.
PO4: Use historical sources and evidence to construct logical arguments.
PO5: Understand the impact of historical developments on contemporary world affairs.
PO6: Promote values such as democracy, liberty, equality, secularism, and human rights.
PO7: Enhance communication skills through written and oral presentations.
PO8: Prepare students for higher studies, competitive examinations, and careers related to history and social sciences.

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Explain the background, causes, and significance of the American War of Independence and the making of the U.S. Constitution.
CO2: Understand the growth of American democracy, federalism, and political institutions in the 19th century.
CO3: Analyze the causes and consequences of the Civil War and the process of Reconstruction.
CO4: Examine industrialization, westward expansion, and social changes in the United States.
CO5: Assess the role of the USA in imperialism, World War I, and inter-war developments.
CO6: Evaluate the impact of the Great Depression, New Deal, and the role of the USA in World War II up to 1945.

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	1	2	1	1
CO2	3	3	2	1	2	3	1	1
CO3	3	3	3	2	2	2	1	1
CO4	3	3	2	2	2	1	1	1
CO5	3	2	3	2	3	2	1	2
CO6	3	3	3	2	3	3	2	2

Course- History of the Marathas (A.D. 1605–1750)

Programme Outcomes (Pos)

PO1: Acquire comprehensive knowledge of major historical events, personalities, and institutions in Indian and world history.

PO2: Understand social, economic, political, and cultural processes in historical contexts.

PO3: Develop critical and analytical thinking through the study of historical developments.

PO4: Interpret historical sources and use evidence to construct logical arguments.

PO5: Relate historical developments to contemporary society and governance.

PO6: Inculcate values of nationalism, leadership, ethics, secularism, and social responsibility.

PO7: Communicate historical ideas effectively through written and oral expression.

PO8: Prepare students for higher education, research, competitive examinations, and careers related to history.

Course Outcomes (COs)

After completing the course, students will be able to:

CO1: Explain the socio-political background of Maharashtra and the emergence of the Marathas.

CO2: Analyze the life, administration, military system, and ideals of Chhatrapati Shivaji Maharaj.

CO3: Examine the expansion of the Maratha power under the Peshwas.

CO4: Understand the Maratha administrative structure, revenue system, and military organization.

CO5: Assess the role of the Marathas in Indian politics and their relations with the Mughals and other regional powers.

CO6: Evaluate the causes of the decline of Maratha power by the mid-18th century.

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	1	1	2	1	1
CO2	3	3	3	2	2	3	1	2
CO3	3	3	3	2	2	2	1	2
CO4	3	3	2	2	2	1	1	1
CO5	3	2	3	2	3	2	1	2
CO6	3	3	3	2	3	2	2	2

F.Y.B.A
History of Modern India
Programme Outcomes (POs)

PO1: Acquire knowledge of major historical events, movements, and personalities in Indian and world history.
PO2: Understand political, social, economic, and cultural transformations in historical contexts.
PO3: Develop critical thinking and analytical skills through historical inquiry.
PO4: Interpret historical sources and construct evidence-based arguments.
PO5: Relate historical developments to contemporary Indian society and governance.
PO6: Inculcate values of nationalism, democracy, secularism, social justice, and human rights.
PO7: Communicate historical ideas effectively through written and oral forms.
PO8: Prepare students for higher studies, research, competitive examinations, and careers in history and related fields.

Course Outcomes (COs)

After completing this course, students will be able to:
CO1: Explain the establishment and expansion of British rule in India.
CO2: Analyze the economic impact of colonialism, including land revenue systems and deindustrialization.
CO3: Understand socio-religious reform movements and cultural awakening in modern India.
CO4: Examine popular resistance and tribal, peasant, and early nationalist movements.
CO5: Assess the growth of Indian nationalism from 1885 to 1947.
CO6: Evaluate constitutional developments, mass movements, and the process of independence and partition.

PO–CO Mapping (Numerical)
(1 = Low, 2 = Moderate, 3 = High)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	1	1	1	1
CO2	3	3	3	2	2	1	1	2
CO3	3	3	2	1	2	3	1	1
CO4	3	3	3	2	2	2	1	2
CO5	3	3	3	2	3	3	2	2
CO6	3	3	3	2	3	3	2	2

S. Y. B. Sc. (Information Technology) Semester - III

Course Code: IT-217 (OE) Course Title: Microsoft Excel-Excel from Beginner to Advanced.

Aqsa Khan

Program Outcomes (POs):

"Upon successful completion of the B.Sc. (Information Technology) program, students will possess the knowledge, skills, and competencies to analyze, design, and implement IT solutions effectively using modern tools and best practices."

1. **PO1 – Knowledge Application:** Apply knowledge of mathematics, computing, and IT tools to solve real-world problems.
2. **PO2 – Problem Analysis:** Identify, analyze, and model computational/IT-related problems, and propose efficient solutions.
3. **PO3 – Design & Development:** Design and develop IT-based applications (spreadsheets, databases, software, websites) to meet requirements.
4. **PO4 – Modern Tool Usage:** Use modern tools (Excel, databases, programming environments) effectively for problem-solving.
5. **PO5 – Communication:** Communicate effectively in written, graphical, and oral forms using IT tools.
6. **PO6 – Professional Ethics:** Apply ethical principles, data integrity, and accuracy while handling information.
7. **PO7 – Lifelong Learning:** Engage in independent learning and adapt to emerging IT tools and technologies.
8. **PO8 – Teamwork & Project Management:** Work effectively in teams and manage IT-based projects.

Course Outcomes (COs):

After completing this course, students will be able to:

1. **CO1:** Create and manage tables, workbooks, and worksheets.
2. **CO2:** Apply **custom data formats, validations, and conditional formatting**.
3. **CO3:** Create, manage, filter, and sort data using **Excel tables**.
4. **CO4:** Use **formulas and functions** (mathematical, conditional, and text functions) for calculations and data analysis.
5. **CO5:** Create and format **charts, objects, PivotTables, and PivotCharts** for data visualization.

CO–PO Mapping Table (IT-217: Microsoft Excel):

(COs) / (POs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	2	2	2	2
CO2	3	2	3	3	2	3	2	2
CO3	3	3	3	3	2	2	2	2
CO4	3	3	3	3	2	2	2	1
CO5	3	3	3	3	3	2	2	2

Legend:

- **3** = Strongly related
- **2** = Moderately related

- **1** = Slightly related
- **Blank** = No relation

Semester - IV

Course Code: IT-225 (OE) Course Title: SQL for All

Program Outcomes (POs):

On completion of the **B.Sc. (Information Technology) program**, students will be able to:

1. **PO1 – Knowledge Application:** Apply knowledge of computing and IT tools to solve problems.
2. **PO2 – Problem Analysis:** Identify, analyze, and model IT-related problems, and propose efficient solutions.
3. **PO3 – Design & Development:** Design and develop IT-based applications and databases to meet requirements.
4. **PO4 – Modern Tool Usage:** Use modern tools (databases, programming environments) effectively.
5. **PO5 – Communication:** Communicate effectively in written, graphical, and oral forms using IT tools.
6. **PO6 – Ethics:** Apply ethical principles and ensure data integrity while handling information.
7. **PO7 – Lifelong Learning:** Engage in independent learning and adapt to emerging IT tools and technologies.
8. **PO8 – Teamwork & Project Management:** Work effectively in teams and manage IT-based projects.

Course Outcomes (COs):

After completing this course, students will be able to:

1. **CO1:** Explain the fundamentals of databases, DBMS, and SQL types.
2. **CO2:** Apply SQL data types in database design.
3. **CO3:** Write SQL queries using clauses, operators, and subqueries.

4. **CO4:** Perform SQL data handling with DDL, DML, and constraints.
5. **CO5:** Apply SQL functions (string, mathematical, date, aggregate) in queries.

CO–PO Mapping (IT-225: SQL for All):

(COs) / (POs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	2	2	2	2	1
CO2	3	2	3	3	2	2	2	2
CO3	3	3	3	3	2	2	2	2
CO4	3	3	3	3	2	2	2	2
CO5	3	3	3	3	3	2	2	2

Legend:

- **3** = Strongly related
- **2** = Moderately related
- **1** = Slightly related
- **Blank** = No relation

S. Y. B. Sc. (Information Technology)

Course Code: IT-211 Course Title: Data Structure-I, Semester - III

Aqsa Khan

Program Outcomes (POs):

On completion of the B.Sc. (IT) program, students will be able to:

1. **PO1 – Knowledge Application:** Apply knowledge of mathematics, computing, and information technology to solve real-world problems.
2. **PO2 – Problem Analysis:** Identify, analyze, and model computational problems, and propose efficient solutions.
3. **PO3 – Design & Development:** Design and develop software systems to meet functional and non-functional requirements.
4. **PO4 – Modern Tool Usage:** Use modern tools, programming environments, and techniques for IT applications.
5. **PO5 – Communication:** Communicate effectively in oral and written form in both technical and non-technical contexts.
6. **PO6 – Professional Ethics:** Apply ethical principles, data integrity, and security practices in IT.
7. **PO7 – Lifelong Learning:** Recognize the need for self-learning and adapt to emerging IT trends.
8. **PO8 – Teamwork & Project Management:** Work effectively as an individual, in teams, and manage IT-related projects.

Course Outcomes (COs):

After completing this course, students will be able to:

1. **CO1**: Explain the need, types, and importance of data structures.
2. **CO2**: Analyze algorithms with respect to **time and space complexity**.
3. **CO3**: Implement and apply **stack operations** (push, pop, peep, change) in problem solving.
4. **CO4**: Apply stacks in **expression conversion (infix–postfix), evaluation, and recursion**.
5. **CO5**: Implement and apply **queue operations** (simple, circular, deque, priority queue).
6. **CO6**: Implement **linked lists** (singly, circular, doubly) with insertion and deletion.
7. **CO7**: Apply **linked lists in real-life applications** (e.g., polynomial manipulation).

CO–PO Mapping Table (IT-211: Data Structure – I):

(COs) / (POs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	1	1	2	1
CO2	3	3	2	2	1	1	2	1
CO3	3	3	3	2	1	1	2	1
CO4	3	3	3	2	1	1	2	1
CO5	3	3	3	2	1	1	2	2
CO6	3	3	3	2	1	1	2	2
CO7	3	3	3	1	2	1	2	1

Legend:

- **3** = Strongly related

- **2** = Moderately related
- **1** = Slightly related
- **Blank** = No relation

Semester IV

Course Code: IT-221 Course Title: Data Structure-II

Program Outcomes (POs):

Students will be equipped with the knowledge and skills to analyze, design, and develop computing solutions using modern technologies and best practices.

1. **PO1:** Apply knowledge of computing fundamentals and data structures to solve problems.
2. **PO2:** Analyze algorithms with respect to time and space complexity.
3. **PO3:** Design and implement efficient data structures for real-world applications.
4. **PO4:** Utilize modern tools and programming environments to implement algorithms.
5. **PO5:** Communicate technical solutions effectively.s
6. **PO6:** Follow ethical practices in computing and data handling.
7. **PO7:** Engage in lifelong learning to keep up with emerging computing technologies.
8. **PO8:** Work effectively in teams and manage small projects in computing.

Course Outcomes (COs):

After completing this course, students will be able to:

1. **CO1:** Analyze algorithms in terms of time and space complexity.
2. **CO2:** Understand and implement tree data structures, including binary trees, threaded trees, and their traversal operations.
3. **CO3:** Understand and implement graph data structures, including adjacency matrix, adjacency list, multilist, and

graph traversal algorithms (BFS, DFS).

4. **CO4:** Apply sorting techniques (Selection, Insertion, Bubble, Merge, Quick Sort) to organize data efficiently.
5. **CO5:** Apply searching techniques (Sequential, Binary, and Hash Table methods) to retrieve data efficiently.

CO–PO Mapping Table (IT-221: Data Structure – II):

(COs) / (POs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	2	2	3	2
CO2	3	3	3	3	2	2	2	2
CO3	3	3	3	3	2	2	2	2
CO4	3	3	3	3	2	2	2	2
CO5	3	3	3	3	2	2	2	2

Legend:

- **3** = Strongly related
- **2** = Moderately related
- **1** = Slightly related
- **Blank** = No relation

S. Y. B. Sc. (Information Technology) Semester - III

Course Code: IT-213 (Major - I)

Course Title: **Lab on Data Structure – I**

Aqsa Khan

Program Outcomes (POs):

On successful completion of the B.Sc. (IT) program, students will be able to:

1. **PO1 – Knowledge Application:** Apply knowledge of mathematics, computing, and IT tools to solve real-world problems.
2. **PO2 – Problem Analysis:** Identify, analyze, and model IT-related problems, and propose efficient solutions.
3. **PO3 – Design & Development:** Design and develop efficient IT-based applications (algorithms, programs, software) to meet requirements.
4. **PO4 – Modern Tool Usage:** Use modern IT tools, programming languages, and development environments effectively.
5. **PO5 – Communication:** Communicate effectively through documentation, presentations, and teamwork in IT-related contexts.
6. **PO6 – Professional Ethics:** Apply ethical principles, integrity, and accuracy in programming and data handling.
7. **PO7 – Lifelong Learning:** Engage in independent learning and adapt to emerging IT tools, technologies, and practices.
8. **PO8 – Teamwork & Project Management:** Work effectively in teams and manage coding projects.

Course Outcomes (COs):

After completing this lab course, students will be able to:

1. **CO1:** Implement stack operations and apply them for expression evaluation and conversion.
2. **CO2:** Apply queue structures (linear and circular) for real-world scheduling and resource management problems.
3. **CO3:** Implement linked list data structures (singly and doubly) with insertion and deletion operations.
4. **CO4:** Select and apply appropriate linear data structures for solving computational problems efficiently.

CO–PO Mapping Table (IT-213: Lab on Data Structure – I):

(COs) / (POs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	2	2	2	2
CO2	3	3	3	3	2	2	2	2
CO3	3	3	3	3	2	2	2	2
CO4	3	3	3	3	2	2	3	2

Legend:

- **3** = Strongly related

- **2** = Moderately related
- **1** = Slightly related
- **Blank** = No relation

Semester - IV

Course Code: IT-212 (Major - II) **Course Title: Lab on Data Structure – II**

Program Outcomes (POs):

On successful completion of the B.Sc. (IT) program, students will be able to:

1. **PO1 – Knowledge Application:** Apply knowledge of mathematics, computing, and IT tools to solve real-world problems.
2. **PO2 – Problem Analysis:** Identify, analyze, and model computational/IT-related problems, and propose efficient solutions.
3. **PO3 – Design & Development:** Design and develop IT-based applications (algorithms, software, databases) to meet requirements.
4. **PO4 – Modern Tool Usage:** Use modern programming tools and environments effectively for problem-solving.
5. **PO5 – Communication:** Communicate effectively in written, graphical, and oral forms for IT- related contexts.
6. **PO6 – Professional Ethics:** Apply ethical principles, integrity, and accuracy in computing practices.
7. **PO7 – Lifelong Learning:** Engage in continuous learning and adapt to emerging IT tools and technologies.
8. **PO8 – Teamwork & Project Management:** Work effectively in teams and manage coding projects.

Course Outcomes (COs):

After completing this lab course, students will be able to:

1. **CO1:** Implement tree data structures and apply

traversal techniques (inorder, preorder, postorder).

2. **CO2:** Implement graph structures and apply traversal techniques (BFS, DFS).
3. **CO3:** Implement and compare various sorting techniques (Selection, Bubble, Insertion, Merge, Quick).
4. **CO4:** Implement and apply searching techniques (Linear and Binary search).
5. **CO5:** Select and apply appropriate non-linear data structures, sorting, and searching techniques for real-world problems.

O–PO Mapping Table (IT-222: Lab on Data Structure – II):

(COs) / (POs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	2	2	2	2
CO2	3	3	3	3	2	2	2	2
CO3	3	3	3	3	2	2	2	2
CO4	3	3	3	3	2	2	3	2
CO5	3	3	3	3	2	2	3	2

Legend:

- **3** = Strongly related
- **2** = Moderately related
- **1** = Slightly related

- **Blank** = No relation

Semester – I

F. Y. MSc. (Information Technology)

Course Code: IT- 411 **Course Title:** Artificial Intelligence

---

Course Outcomes (COs):

After completion of this course, students will be able to:

CO1: Analyze the historical foundations, techniques, and applications of Artificial Intelligence and intelligent agents.

CO2: Formulate real-world problems as state space models and apply uninformed and informed search strategies to obtain optimal solutions.

CO3: Design knowledge representation schemes using logic, semantic networks, frames, and scripts for intelligent systems.

CO4: Evaluate and apply reasoning mechanisms such as probabilistic reasoning, Bayesian networks, fuzzy logic, and non-monotonic reasoning.

CO5: Develop intelligent systems using game playing algorithms, planning techniques, and machine learning methods for real-life applications.

Program Outcomes (POs):

1. **PO1:** Advanced computing knowledge and problem-solving skills
2. **PO2:** Analyze, model and solve complex IT problems
3. **PO3:** Design and develop intelligent computing systems
4. **PO4:** Conduct research and investigate computing problems using modern tools
5. **PO5:** Use contemporary tools, technologies and programming frameworks
6. **PO6:** Professional ethics, teamwork and communication skills
7. **PO7:** Life-long learning and adaptation to emerging technologies

CO–PO Mapping Matrix: (**3**–High, **2**–Medium, **1**–Low, **Blank** – No relation)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	–	1	–	–	2
CO2	3	3	2	2	2	–	2
CO3	3	3	3	2	2	–	2
CO4	3	3	2	3	2	–	2
CO5	3	3	3	3	3	1	3

F. Y. MSc. (Information Technology)

Course Code: IT- 412 **Course Title:** Network Programming

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze client–server architecture and explain the working of layered network models and Internet protocols.

CO2: Develop and implement UDP and TCP based socket programs for reliable and unreliable network communication.

CO3: Design and deploy network servers and services such as HTTP, FTP, SMTP, SSH, and RPC for distributed applications.

CO4: Apply DNS resolution, IPv4/IPv6 addressing, and advanced socket programming techniques to build scalable and efficient network applications.

CO5: Troubleshoot, test, and optimize network programs for performance, reliability, and security in real-world environments.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing fundamentals and networking concepts
2. **PO2:** Analyze and solve complex IT and networking problems
3. **PO3:** Design, develop and deploy software/network-based solutions
4. **PO4:** Investigate and conduct experiments using modern tools and technologies
5. **PO5:** Use contemporary programming frameworks, libraries and tools effectively
6. **PO6:** Professional ethics, teamwork and communication skills
7. **PO7:** Life-long learning and adaptation to emerging technologies

CO–PO Mapping Matrix: (**3**–High, **2**–Medium, **1**–Low, **Blank** – No relation)

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	–	1	–	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	1	2
CO4	3	3	3	3	3	–	2
CO5	2	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 413 **Course Title:** Current Computing Trends in Java

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze and configure Spring Boot framework to develop standalone, production-ready Java applications.
CO2: Design and implement database-driven applications using Hibernate ORM and Spring Data JPA for efficient data management.
CO3: Develop RESTful web services and APIs using Spring Boot and handle HTTP operations, serialization, and exception management.

CO4: Implement authentication and authorization mechanisms using Spring Security and JWT to build secure applications.
CO5: Apply advanced features such as caching, asynchronous processing, external integrations, and deployment strategies for high-performance systems.
CO6: Design and deploy scalable microservices-based architectures using Spring Boot with service discovery, load balancing, and monitoring tools.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing concepts and software technologies
2. **PO2:** Analyze and solve complex IT problems using appropriate methodologies
3. **PO3:** Design, develop, and deploy scalable and reliable software systems

4. **PO4:** Conduct investigations and experiments using modern tools and frameworks
5. **PO5:** Use contemporary tools, platforms, and programming practices effectively
6. **PO6:** Demonstrate professional ethics, teamwork, and communication skills
7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2 =** Medium**, 1 =** Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	3	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	1	2
CO4	3	3	3	2	3	1	2

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO5	3	3	3	3	3	1	3
CO6	3	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 414 **Course Title:** Lab on Artificial Intelligence and Network Programming

---

Course Outcomes (COs):

After successful completion of this laboratory course, students will be able to:

CO1: Implement AI algorithms and problem-solving techniques by converting theoretical models into executable programs.

CO2: Apply state space search methods (DFS, BFS, A*, heuristic search) to solve classical AI problems such as Tic-Tac-Toe, Water-Jug, Tower of Hanoi, and TSP.
CO3: Analyze runtime complexity and evaluate the performance of algorithms using profiling and testing tools.
CO4: Debug, test, and optimize AI programs to improve efficiency, accuracy, and reliability.
CO5: Develop practical solutions for real-world applications such as chatbots and intelligent systems using appropriate programming tools and frameworks.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing fundamentals and algorithms.
2. **PO2:** Analyze and solve complex computational problems.
3. **PO3:** Design, develop, and implement efficient software solutions.
4. **PO4:** Investigate, test, and evaluate systems using modern tools.
5. **PO5:** Use contemporary programming tools and technologies effectively.
6. **PO6:** Demonstrate teamwork, ethics, and professional responsibility.
7. **PO7:** Engage in life-long learning and adapt to emerging technologies.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	3	1	3	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	2	3	2	–	2
CO4	2	3	3	3	3	1	2
CO5	2	3	3	2	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 415 **Course Title:** Lab on Current Computing Trends in Java

Course Outcomes (COs):

After successful completion of this laboratory course, students will be able to:

CO1: Implement object serialization and data transfer mechanisms for sending and retrieving information across networked applications.

CO2: Design and map Java entities to relational databases using Hibernate/Spring JPA and perform CRUD operations without writing raw SQL.

CO3: Develop RESTful web services to handle HTTP requests (GET, POST, PUT, DELETE) and perform request/response serialization.

CO4: Build and test database-driven enterprise applications such as blog, e-commerce, employee, and library management systems using Spring Boot.

CO5: Design and deploy scalable microservices for real-world use cases such as user registration and order management using Spring Boot and JPA.

CO6: Debug, test, and optimize applications for performance, reliability, and maintainability using modern development tools and best practices.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing concepts and software technologies
2. **PO2:** Analyze and solve complex IT/software engineering problems
3. **PO3:** Design, develop, and deploy scalable software systems

4. **PO4:** Conduct testing, experimentation, and investigation using modern tools
5. **PO5:** Use contemporary frameworks, platforms, and development tools effectively
6. **PO6:** Demonstrate teamwork, ethics, and professional responsibility
7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	1	3	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	1	2
CO4	3	3	3	3	3	1	2

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO5	3	3	3	3	3	2	3
CO6	2	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 416(A) **Course Title:** Big Data Analytics

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze the characteristics, challenges, and architectural requirements of Big Data systems and identify suitable analytical frameworks for real-world applications.

CO2: Design and implement distributed data storage and processing solutions using Hadoop and HDFS commands.

CO3: Develop MapReduce programs to process large-scale datasets using advanced techniques such as joins, sorting, and pipelining.

CO4: Apply Hadoop ecosystem tools (Pig, Hive, HBase, Big SQL) for querying, managing, and analyzing structured and unstructured data.

CO5: Perform data analytics and machine learning tasks using R to extract patterns, predictions, and insights from big datasets.

CO6: Evaluate real-life case studies and propose scalable Big Data solutions bridging academic concepts with industry needs.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing concepts and data technologies
2. **PO2:** Analyze and solve complex computational/data problems

3. **PO3:** Design and develop scalable software and data-driven systems
4. **PO4:** Conduct investigation and experimentation using modern tools
5. **PO5:** Use contemporary frameworks, platforms, and analytics tools effectively
6. **PO6:** Demonstrate teamwork, ethics, and professional responsibility
7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	2	1	2	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	3	3	–	2
CO4	3	3	3	2	3	1	2

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO5	3	3	2	3	3	–	3
CO6	3	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 416(B) **Course Title:** Cloud Computing

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze the principles, service models (IaaS, PaaS, SaaS), and deployment models (public, private, hybrid) of cloud computing and evaluate their benefits and challenges.

CO2: Design efficient server and data center architectures considering scalability, virtualization, clustering, power optimization, and cost trade-offs.

CO3: Apply virtualization and resource management techniques to develop and manage virtualized cloud infrastructures and disaster recovery solutions.

CO4: Plan and implement storage network architectures using NAS, SAN, and hybrid technologies for cloud environments.

CO5: Evaluate and implement cloud security mechanisms including authentication, access control, cryptography, and secure key management.

CO6: Propose and analyze cloud-based solutions for real-world enterprise applications using appropriate programming and deployment models.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing and cloud technologies
2. **PO2:** Analyze and solve complex computing and infrastructure problems

3. **PO3:** Design, develop, and deploy scalable and reliable IT systems
4. **PO4:** Conduct investigation, testing, and evaluation using modern tools
5. **PO5:** Use contemporary platforms, virtualization, and cloud technologies effectively
6. **PO6:** Demonstrate teamwork, ethics, and professional responsibility
7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	2	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	–	2
CO4	3	3	3	2	3	–	2

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO5	3	3	2	3	3	1	2
CO6	3	3	3	3	3	2	3

Semester – II

F. Y. MSc. (Information Technology)

Course Code: IT- 421 **Course Title:** Data Warehousing and Data Mining

---

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze the architecture, lifecycle, and components of data warehousing systems and design data marts for decision support applications.

CO2: Differentiate between OLTP and OLAP systems and implement multidimensional analytical models and cube operations for business intelligence.

CO3: Apply data preprocessing techniques such as cleaning, integration, transformation, reduction, and discretization to prepare datasets for mining.

CO4: Design and implement association rule mining algorithms to discover frequent patterns and correlations from large datasets.

CO5: Develop classification and prediction models using decision trees, Bayesian methods, SVMs, and rule- based approaches.

CO6: Apply clustering and outlier detection techniques to analyze complex and high-dimensional datasets for knowledge discovery.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing, data, and analytical techniques
2. **PO2:** Analyze and solve complex data-driven problems
3. **PO3:** Design and develop scalable data processing and decision-support systems

4. **PO4:** Conduct investigation and experimentation using modern analytical tools
5. **PO5:** Use contemporary software tools, platforms, and data mining frameworks effectively
6. **PO6:** Demonstrate teamwork, ethics, and professional responsibility
7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	3	1	2	–	2

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO2	3	3	3	2	2	–	2
CO3	3	3	2	3	3	–	2
CO4	3	3	3	2	3	–	2
CO5	3	3	3	3	3	1	3
CO6	3	3	3	3	3	1	3

F. Y. MSc. (Information Technology)

Course Code: IT- 422 **Course Title:** Angular

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze the architecture and features of Angular and set up development environments to build modern web applications.

CO2: Design modular and reusable user interfaces using components, modules, directives, and dependency injection principles.

CO3: Implement dynamic data binding and form handling techniques to develop interactive and responsive Single Page Applications (SPAs).

CO4: Develop and integrate services to retrieve, manipulate, and display data from backend servers using HTTP and REST APIs.

CO5: Apply validation, routing, and state management techniques to build scalable, maintainable, and user- friendly web applications.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing and web technologies
2. **PO2:** Analyze and solve complex software development problems
3. **PO3:** Design, develop, and deploy scalable web applications
4. **PO4:** Conduct testing and evaluation using modern development tools
5. **PO5:** Use contemporary frameworks, libraries, and platforms effectively
6. **PO6:** Demonstrate teamwork, communication, and professional ethics

7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	2	1	3	–	2
CO2	3	3	3	2	3	1	2
CO3	3	3	3	2	3	1	2
CO4	2	3	3	2	3	1	2
CO5	2	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 423 **Course Title:** Compiler Construction

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze the structure and phases of a compiler and apply the analysis–synthesis model for language translation.

CO2: Design and implement lexical analyzers using regular expressions, finite automata, and tools such as LEX for token recognition and error handling.

CO3: Construct syntax analyzers using top-down and bottom-up parsing techniques (LL, LR, SLR, LALR) and implement them using parser generators like YACC.

CO4: Develop syntax-directed translation schemes, perform semantic analysis, and implement type checking and symbol table management.

CO5: Design runtime environments and intermediate code representations, and apply storage allocation and parameter passing mechanisms.

CO6: Generate optimized target code using instruction selection, register allocation, DAG-based optimization, and code generation techniques.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing theory and system software concepts
2. **PO2:** Analyze and solve complex computational and language processing problems
3. **PO3:** Design and develop efficient software tools and translators

4. **PO4:** Conduct investigation, testing, and evaluation of systems using modern tools
5. **PO5:** Use contemporary development environments, compiler tools, and frameworks effectively
6. **PO6:** Demonstrate teamwork, communication, and professional ethics
7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	2	1	2	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	–	2

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO4	3	3	3	3	2	–	2
CO5	3	3	3	2	2	–	2
CO6	3	3	3	3	3	1	3

F. Y. MSc. (Information Technology)

Course Code: IT- 424 **Course Title:** Lab on Data Warehousing and Data Mining

---

Course Outcomes (COs):

After successful completion of this laboratory course, students will be able to:

CO1: Prepare and preprocess datasets using cleaning, transformation, normalization, and discretization techniques for data analysis.

CO2: Implement association rule mining algorithms (e.g., Apriori) to discover frequent itemsets and relationships from datasets.

CO3: Apply classification techniques such as Decision Trees (J48) and Naïve Bayes to build predictive models.

CO4: Perform clustering using algorithms like K-Means to group similar data objects and interpret patterns.

CO5: Utilize data mining tools and platforms (e.g., WEKA/R/Python) to analyze enterprise data and extract actionable insights.

CO6: Design and evaluate data warehouse–based analytical solutions for real-world decision support systems.

Program Outcomes (POs):

1. **PO1:** Advanced knowledge of computing and data analytics concepts
2. **PO2:** Analyze and solve complex data-driven problems
3. **PO3:** Design and implement data processing and analytical systems
4. **PO4:** Conduct experiments, testing, and evaluation using modern tools
5. **PO5:** Use contemporary data mining tools and technologies effectively

6. **PO6:** Demonstrate teamwork, ethics, and professional responsibility
7. **PO7:** Engage in life-long learning and adapt to emerging data technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	3	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	–	2
CO4	3	3	3	2	3	–	2
CO5	2	3	3	3	3	1	3

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO6	3	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 425 **Course Title:** Lab on Angular JS

Course Outcomes (COs):

After successful completion of this laboratory course, students will be able to:

CO1: Develop basic AngularJS applications using scripts, expressions, and directives.

CO2: Create modules, controllers, and components to organize and structure web applications.

CO3: Implement data binding techniques (one-way and two-way) to dynamically update user interfaces.

CO4: Utilize AngularJS services, dependency injection, and routing to build modular and maintainable applications.

CO5: Design interactive forms with validations and integrate user inputs with business logic.

CO6: Build complete Single Page Applications (SPA) that communicate with backend services for dynamic data handling.

Program Outcomes (POs):

1. **PO1:** Apply knowledge of computing fundamentals and modern web technologies
2. **PO2:** Analyze and solve real-world software development problems
3. **PO3:** Design and develop scalable and user-friendly applications
4. **PO4:** Conduct testing, debugging, and performance evaluation
5. **PO5:** Use modern tools, frameworks, and development platforms
6. **PO6:** Work effectively in teams with professional ethics

7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	2	2	3	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	–	2
CO4	3	3	3	3	3	1	2
CO5	2	3	3	3	3	1	2
CO6	3	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 426(A1) **Course Title:** Web Analytics

Course Outcomes (COs): After successful completion of this course, students will be able to:

CO1: Explain the fundamentals, importance, and processes of web and social media analytics.

CO2: Apply qualitative analysis techniques such as heuristic evaluation, surveys, and site visits to assess website usability and performance.

CO3: Analyze web metrics, dashboards, KPIs, and conversion funnels to evaluate website effectiveness.

CO4: Collect, segment, and interpret data from multiple sources (server logs, visitor data, search engines, social media) for actionable insights.

CO5: Use tools like Google Analytics and perform traffic, audience, acquisition, behavior, and conversion analysis for business decision-making.

CO6: Design data-driven strategies to improve user engagement, customer retention, and website performance.

Program Outcomes (POs):

1. **PO1:** Apply computing and analytical knowledge to solve problems
2. **PO2:** Analyze data and extract meaningful insights
3. **PO3:** Design technology-based solutions for business problems
4. **PO4:** Use modern tools and platforms effectively

5. **PO5:** Conduct experiments, evaluate results, and interpret findings
6. **PO6:** Work effectively in teams and communicate professionally
7. **PO7:** Engage in life-long learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	–	1	–	–	2
CO2	2	3	2	1	2	1	2
CO3	3	3	2	2	3	–	2
CO4	3	3	3	2	3	1	2
CO5	2	3	3	3	3	1	3
CO6	3	3	3	2	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 426(B1) **Course Title:** Soft Computing

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Explain the fundamentals, components, advantages, and applications of Soft Computing techniques.

CO2: Design and implement Fuzzy Logic systems using membership functions, rules, and inference mechanisms for control and decision-making problems.

CO3: Develop and train Artificial Neural Network models using appropriate architectures, activation functions, and learning algorithms.

CO4: Apply Genetic Algorithms for optimization and search problems using selection, crossover, and mutation operations.

CO5: Integrate Soft Computing techniques (Neuro-Fuzzy, GA-based solutions) to solve complex real-world problems effectively.

CO6: Evaluate and compare Soft Computing methods with traditional approaches to select suitable techniques for specific applications.

Program Outcomes (POs):

1. **PO1:** Apply computing knowledge to solve complex problems
2. **PO2:** Analyze and interpret data for decision-making
3. **PO3:** Design and develop intelligent computing solutions
4. **PO4:** Use modern software tools and technologies effectively
5. **PO5:** Conduct experiments and evaluate performance of systems

6. **PO6:** Communicate and work effectively in teams
7. **PO7:** Engage in lifelong learning and adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	–	1	–	–	2
CO2	3	3	3	2	2	–	2
CO3	3	3	3	3	3	1	3
CO4	3	3	3	2	3	–	2

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO5	3	3	3	3	3	2	3
CO6	2	3	2	2	3	1	3

F. Y. MSc. (Information Technology)

Course Code: IT- 426(A2) **Course Title:** Lab on Web Analytics

---

Course Outcomes (COs):

After successful completion of the course, students will be able to:

CO1: Explain the fundamentals of web and social media analytics.

CO2: Collect and analyze data from social platforms using APIs and analytical tools.

CO3: Measure user behavior and performance metrics using Google Analytics.

CO4: Segment traffic and interpret KPIs to evaluate website engagement.

CO5: Apply web analytics techniques to real-world case studies such as e-commerce platforms.

Program Outcomes (POs):

1. **PO1:** Apply computing knowledge to solve problems
2. **PO2:** Analyze data and interpret results
3. **PO3:** Design and develop IT solutions
4. **PO4:** Use modern tools and technologies
5. **PO5:** Conduct experiments and evaluate performance
6. **PO6:** Communicate effectively
7. **PO7:** Adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	–	1	–	–	2
CO2	3	3	2	3	2	–	2
CO3	3	3	2	3	3	–	2
CO4	3	3	3	2	3	1	2
CO5	3	3	3	3	3	2	3

F. Y. MSc. (Information Technology)

Course Code: IT- 426(B2) **Course Title:** LAB on Soft Computing

---

Course Outcomes (COs):

After successful completion of the course, students will be able to:

CO1: Explain the fundamentals of web and social media analytics.

CO2: Collect and analyze data from social platforms using APIs and analytical tools.

CO3: Measure user behavior and performance metrics using Google Analytics.

CO4: Segment traffic and interpret KPIs to evaluate website engagement.

CO5: Apply web analytics techniques to real-world case studies such as e-commerce platforms.

Program Outcomes (POs):

1. **PO1:** Apply computing knowledge to solve problems
2. **PO2:** Analyze data and interpret results
3. **PO3:** Design and develop IT solutions
4. **PO4:** Use modern tools and technologies
5. **PO5:** Conduct experiments and evaluate performance
6. **PO6:** Communicate effectively
7. **PO7:** Adapt to emerging technologies

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	2	2	–	1	–	–	2
CO2	3	3	2	3	2	–	2
CO3	3	3	2	3	3	–	2
CO4	3	3	3	2	3	1	2
CO5	3	3	3	3	3	2	3

Semester – III

S. Y. MSc. (Information Technology)

Course Code: IT- 511 **Course Title:** Cyber Security

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Understand fundamental concepts of cyber security and cyberspace.

CO2: Identify various cyber threats, attacks, and malware techniques.

CO3: Apply authentication methods, security models, and intrusion detection/prevention mechanisms.

CO4: Analyze online, network, cloud, and system security practices.

CO5: Understand cyber crimes, cyber laws, and legal/ethical responsibilities in digital environments.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve real-world problems.

PO2: Analyze problems and design appropriate solutions.

PO3: Develop secure and efficient software/systems.

PO4: Use modern tools and technologies effectively.

PO5: Understand professional, ethical, and legal responsibilities.

PO6: Work effectively individually and in teams.

PO7: Engage in lifelong learning and adapt to emerging technologies.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	2	2	1	1	–	–	2
CO2	3	3	2	2	–	–	2
CO3	3	3	3	3	2	1	2
CO4	3	3	3	3	2	1	2
CO5	2	2	2	1	3	2	2

S. Y. MSc. (Information Technology)

Course Code: IT- 512 **Course Title:** Design and Analysis of Algorithm

---

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Analyze time and space complexity of algorithms using asymptotic notations.
CO2: Design and implement algorithms using divide-and-conquer techniques.
CO3: Apply greedy and dynamic programming methods to solve optimization problems.
CO4: Model and solve problems using graph traversal and search techniques.
CO5: Develop solutions using backtracking and combinatorial problem-solving approaches.
CO6: Classify computational problems and understand NP-complete and nondeterministic polynomial time concepts.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve real-world problems.
PO2: Analyze problems and design efficient algorithmic solutions.
PO3: Develop optimized and reliable software systems.
PO4: Use modern tools and technologies effectively.
PO5: Demonstrate logical thinking and problem-solving skills.
PO6: Work effectively individually and in teams.
PO7: Engage in lifelong learning and adapt to emerging technologies.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	3	–	2
CO2	3	3	3	2	3	–	2
CO3	3	3	3	2	3	1	2
CO4	3	3	3	2	3	1	2
CO5	3	3	2	1	3	1	2
CO6	2	3	2	1	3	–	3

S. Y. MSc. (Information Technology)

Course Code: IT- 514 **Course Title:** Digital Image Processing

---

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Explain fundamental concepts of digital image processing, sampling, quantization, and image representation.

CO2: Apply image enhancement and restoration techniques in spatial and frequency domains.

CO3: Perform image segmentation and morphological operations to extract meaningful regions.

CO4: Implement feature extraction and object recognition techniques using image processing libraries (e.g., Python/OpenCV).

CO5: Analyze and apply image processing methods to real-world applications such as biometrics, character recognition, and medical imaging.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve real-world problems.

PO2: Analyze problems and design appropriate solutions.

PO3: Develop efficient and reliable software solutions.

PO4: Use modern tools and technologies effectively.

PO5: Conduct experiments and interpret data.

PO6: Work effectively individually and in teams.

PO7: Engage in lifelong learning and adapt to emerging technologies.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	1	1	–	–	2
CO2	3	3	2	3	3	–	2
CO3	3	3	3	3	3	1	2
CO4	3	3	3	3	3	2	3
CO5	3	3	3	3	3	2	3

S. Y. MSc. (Information Technology)

Course Code: IT- 515 **Course Title:** Lab on Design and Analysis of Algorithm

---

Course Outcomes (COs):

After successful completion of this laboratory course, students will be able to:

CO1: Implement various data structures and algorithms using C++.

CO2: Analyze time and space complexity by measuring execution performance.

CO3: Apply algorithm design techniques such as divide-and-conquer, greedy, dynamic programming, and graph algorithms.

CO4: Debug, test, and optimize algorithms for improved efficiency.

CO5: Evaluate and compare algorithm performance using profiling and experimental analysis.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve real-world problems.

PO2: Analyze problems and design efficient solutions.

PO3: Develop and implement reliable software systems.

PO4: Use modern tools and programming technologies effectively.

PO5: Conduct experiments, analyze results, and interpret performance metrics.

PO6: Work effectively individually and in teams.

PO7: Engage in lifelong learning and adapt to new technologies.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	–	1	2
CO2	3	3	2	2	3	–	2
CO3	3	3	3	2	2	1	2
CO4	3	3	3	2	3	1	2
CO5	2	3	2	2	3	1	3

S. Y. MSc. (Information Technology)

Course Code: ITE- 516(A) **Course Title:** Ethical Hacking

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Explain ethical hacking concepts along with legal, ethical, and professional responsibilities.

CO2: Analyze networking fundamentals and apply security principles to protect systems and wireless networks.

CO3: Perform information gathering, foot printing, and reconnaissance using various tools and techniques.

CO4: Conduct network scanning and vulnerability identification using tools like Nmap and Wireshark.

CO5: Use Kali Linux tools effectively and recommend remediation and security measures to secure systems.

Program Outcomes (POs):

PO1: Apply computing and security knowledge to solve real-world problems.

PO2: Analyze problems and identify vulnerabilities in systems and networks.

PO3: Design and develop secure computing

solutions.

PO4: Use modern tools and technologies effectively.

PO5: Conduct investigations, analyze results, and interpret findings.

PO6: Work effectively individually and in teams with professional ethics.

PO7: Engage in lifelong learning and adapt to evolving cyber security technologies.

CO–PO Mapping Matrix: (3 = High**, 2 =** Medium**, 1 =** Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	–	–	3	2
CO2	3	3	3	2	2	1	2
CO3	3	3	2	3	3	1	2
CO4	3	3	2	3	3	1	2
CO5	3	2	3	3	2	1	3

S. Y. MSc. (Information Technology)

Course Code: ITE- 516(B) **Course Title:** Internet of Things (IoT)

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Explain IoT concepts, terminology, architecture, and enabling technologies.

CO2: Design IoT systems using appropriate sensors and actuators.

CO3: Apply IoT communication protocols and standards for device connectivity and data exchange.

CO4: Implement data storage, cloud computing, and analytics techniques for IoT data processing.

CO5: Analyze and develop IoT solutions for real-world applications across various domains.

CO6: Integrate APIs and platforms to connect and manage IoT devices and services

Program Outcomes (POs):

PO1: Apply computing and engineering knowledge to solve problems.

PO2: Analyze problems and design appropriate solutions.

PO3: Design and develop systems meeting practical requirements.

PO4: Use modern tools, technologies, and platforms effectively.

PO5: Conduct investigations and analyze data for decision making.

PO6: Work effectively in teams with professional and ethical responsibility.

PO7: Engage in lifelong learning to adapt to emerging technologies.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	2	2	1	–	2
CO2	3	3	3	2	2	1	2
CO3	3	3	3	3	2	1	2
CO4	3	2	3	3	3	1	3
CO5	3	3	3	2	2	2	2
CO6	2	2	3	3	2	1	3

S. Y. MSc. (Information Technology)

Course Code: ITE- 516(C) **Course Title:** Swayam/NPTEL

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Acquire domain-specific knowledge through completion of a certified SWAYAM/NPTEL course.
CO2: Apply theoretical concepts to solve practical and real-world problems.
CO3: Demonstrate self-learning, time management, and independent study skills.
CO4: Utilize online learning platforms and digital tools effectively for professional development. **CO5:** Analyze and evaluate concepts through assignments, quizzes, and certification examinations. **CO6:** Develop lifelong learning habits to adapt to emerging technologies and trends.

Program Outcomes (POs):

PO1: Apply computing and engineering knowledge to solve problems.
PO2: Analyze problems and design appropriate solutions.
PO3: Design and develop systems meeting practical requirements.
PO4: Use modern tools, technologies, and platforms effectively.
PO5: Conduct investigations and analyze data for decision making.
PO6: Work effectively in teams with professional and ethical responsibility.
PO7: Engage in lifelong learning to adapt to emerging technologies.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	–	2
CO2	3	3	3	2	2	1	2
CO3	2	2	2	3	1	2	3
CO4	2	2	2	3	1	1	3
CO5	3	3	2	2	3	1	2
CO6	2	2	2	2	1	1	3

S. Y. MSc. (Information Technology)

Course Code: IT- 517 **Course Title:** Research Project

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Identify research problems, research gaps, and formulate clear objectives in computing/IT domains.

CO2: Conduct literature survey and apply appropriate research methodologies and techniques. **CO3:** Design and implement innovative hardware/software-based solutions to real-world problems. **CO4:** Analyze results, interpret findings, and evaluate system performance effectively.

CO5: Demonstrate project planning, documentation, time management, and professional ethics.

CO6: Communicate research outcomes effectively through technical reports and presentations.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve complex problems.

PO2: Analyze problems and design appropriate solutions. **PO3:** Design and develop systems to meet specified needs.

PO4: Use modern tools and technologies effectively.

PO5: Conduct research, experiments, and analyze data. **PO6:** Work professionally with ethics and responsibility.

PO7: Engage in lifelong learning and independent study.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	3	2	1	3	1	2
CO2	3	3	2	2	3	1	2
CO3	3	3	3	3	2	1	2
CO4	3	3	2	2	3	1	2
CO5	2	2	2	2	1	3	3
CO6	2	2	1	1	1	3	2

Semester – IV

S. Y. MSc. (Information Technology)

Course Code: IT- 521 **Course Title:** Advanced Operating System

---

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Understand architecture, components and working principles of UNIX/Linux operating systems.
CO2: Apply system calls for file handling, directory operations, and file system management.
CO3: Analyze process management concepts including scheduling, IPC, and signals.
CO4: Implement signal handling and process control mechanisms in UNIX/Linux.
CO5: Evaluate various memory management techniques such as paging, segmentation, and virtual memory.
CO6: Design solutions for synchronization, protection, and security issues in operating systems.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve complex problems.
PO2: Analyze problems and design appropriate solutions.
PO3: Design and develop computing systems.
PO4: Use modern tools and operating system utilities effectively.
PO5: Conduct experiments, analyze and interpret data. **PO6:** Apply professional and ethical

responsibilities.

PO7: Engage in lifelong learning.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	1	1	2
CO2	3	3	3	3	1	1	2
CO3	3	3	2	2	2	1	2
CO4	3	3	2	3	2	1	2
CO5	3	3	3	2	3	1	2
CO6	2	3	3	2	2	3	3

S. Y. MSc. (Information Technology)

Course Code: IT- 522 **Course Title:** Machine Learning with Python

---

Course Outcomes (COs):

After successful completion of this course, students will be able to:

CO1: Understand fundamentals and implementation procedures of machine learning algorithms.
CO2: Design and develop Python programs using ML libraries for data analysis and model building.
CO3: Apply suitable datasets and preprocessing techniques for training ML models.
CO4: Implement supervised, unsupervised, and reinforcement learning algorithms to solve problems.
CO5: Analyze and evaluate model performance and apply ML techniques to real-world applications.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve complex problems.
PO2: Analyze problems and design appropriate solutions.
PO3: Design and develop computing systems/applications.
PO4: Use modern tools and technologies effectively.
PO5: Conduct experiments and interpret data.
PO6: Apply professional and ethical practices.

PO7: Engage in lifelong learning.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2	1	1	2
CO2	3	3	3	3	2	1	2
CO3	3	3	2	3	3	1	2
CO4	3	3	3	3	2	1	2
CO5	3	3	3	2	3	2	3

S. Y. MSc. (Information Technology)

Course Code: IT- 523 **Course Title:** Lab on Advanced Operating System

---

Course Outcomes (COs):

After completion of this course, students shall be able to:

CO1: Use UNIX/Linux commands, shell programming, and basic utilities for system-level tasks.

CO2: Implement and use UNIX system calls for process creation, execution, and file handling.

CO3: Develop programs using inter-process communication and signal handling mechanisms.

CO4: Demonstrate memory management techniques such as paging and segmentation through implementation.

CO5: Analyze and solve practical operating system problems related to multitasking and resource management.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve complex problems.

PO2: Analyze problems and design appropriate solutions.

PO3: Design and develop computing systems/applications.

PO4: Use modern tools and technologies effectively.

PO5: Conduct experiments and interpret results.

PO6: Apply professional and ethical practices.

PO7: Engage in lifelong learning.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	1	1	2
CO2	3	3	3	3	2	1	2
CO3	3	3	3	3	2	1	2
CO4	3	2	3	2	3	1	2
CO5	3	3	3	2	3	2	3

S. Y. MSc. (Information Technology)

Course Code: IT- 524 **Course Title:** Lab on Machine Learning with Python

---

Course Outcomes (COs):

After completion of this course, students shall be able to:

CO1: Implement machine learning algorithms (regression, classification, clustering) using Python programming.

CO2: Apply appropriate datasets and preprocessing techniques for training and testing ML models.

CO3: Evaluate and compare model performance using suitable accuracy and validation metrics.

CO4: Design and develop solutions for real-world business and research problems using ML techniques.

CO5: Build and deploy advanced models such as SVM, KNN, Random Forest, and Neural Networks.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve complex problems.

PO2: Analyze problems and design appropriate solutions.

PO3: Design and develop computing systems/applications.

PO4: Use modern tools and technologies effectively.

PO5: Conduct experiments and interpret results.

PO6: Apply professional and ethical practices.

PO7: Engage in lifelong learning.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	3	3	2	1	2
CO2	3	3	2	3	3	1	2
CO3	2	3	2	3	3	1	2
CO4	3	3	3	3	2	2	3
CO5	3	2	3	3	3	1	3

S. Y. MSc. (Information Technology)

Course Code: IT- 525(A) **Course Title:** Network Security & Firewall

---

Course Outcomes (COs):

CO1: Explain the concepts of network security, security services, mechanisms, and various types of attacks.

CO2: Apply symmetric and public key cryptographic techniques for secure data transmission and key management.

CO3: Implement authentication mechanisms including hashes, MACs, Kerberos, and certificate-based systems.

CO4: Analyze and configure firewalls, VPNs, IP security, and TLS for protecting networks and web systems.

CO5: Design secure network architectures using appropriate security models and protection strategies.

Program Outcomes (POs):

PO1: Apply computing and security knowledge to solve problems.

PO2: Analyze security threats and design protective solutions.

PO3: Design and develop secure systems and applications.

PO4: Use modern tools and technologies effectively.

PO5: Conduct testing and evaluation of security mechanisms.

PO6: Apply professional, ethical, and legal responsibilities.

PO7: Engage in lifelong learning.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	2	2	2
CO2	3	2	3	3	2	1	2
CO3	2	3	3	3	3	2	2
CO4	3	3	3	3	3	2	2
CO5	3	3	3	2	2	2	3

S. Y. MSc. (Information Technology)

Course Code: IT- 525(B) **Course Title:** Natural Language Processing

---

Course Outcomes (COs):

CO1: Demonstrate understanding of fundamental concepts, applications, and challenges in Natural Language Processing.

CO2: Apply text preprocessing and linguistic analysis techniques such as tokenization, stemming, morphology, and corpus handling.

CO3: Implement POS tagging and parsing using rule-based and statistical approaches.

CO4: Design and implement NLP algorithms for syntactic and semantic analysis.

CO5: Analyze mathematical, probabilistic, and linguistic models used in NLP tasks.

CO6: Develop real-world NLP applications such as sentiment analysis, machine translation, summarization, and information extraction.

Program Outcomes (POs):

PO1: Apply computing fundamentals to solve problems.

PO2: Analyze complex problems and design solutions.

PO3: Design and develop intelligent software systems.

PO4: Use modern tools, technologies, and programming frameworks.

PO5: Conduct experiments, evaluate and interpret results.

PO6: Understand professional, ethical, and societal responsibilities.

PO7: Engage in independent learning and research.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	1	1	1	2	2
CO2	3	3	2	3	2	1	2
CO3	3	3	3	3	2	1	2
CO4	3	3	3	3	3	1	2
CO5	3	3	2	2	3	1	2
CO6	3	3	3	3	3	2	3

S. Y. MSc. (Information Technology)

Course Code: ITE- 525(C) **Course Title:** Swayam/NPTEL

Course Outcomes (COs):

CO1: Understand the fundamental concepts of the selected NPTEL/SWAYAM course domain.

CO2: Apply theoretical knowledge to solve domain-specific problems through assignments and quizzes.

CO3: Develop practical and analytical skills through hands-on exercises and case studies.

CO4: Utilize modern tools, technologies, and platforms relevant to the chosen course.

CO5: Demonstrate self-learning, time management, and independent problem-solving abilities.

CO6: Successfully complete certification by meeting academic and professional standards.

Program Outcomes (POs):

PO1: Apply computing and domain knowledge to solve problems.

PO2: Analyze problems and design effective solutions.

PO3: Design and develop software/technical solutions.

PO4: Use modern tools and technologies effectively.

PO5: Conduct experiments and interpret results.

PO6: Understand professional, ethical, and societal responsibilities.

PO7: Engage in lifelong learning and self-development.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	1	1	1	1	2
CO2	3	3	2	2	2	1	2
CO3	2	3	3	3	3	1	2
CO4	2	2	3	3	2	1	2
CO5	2	2	2	2	2	2	3
CO6	2	2	2	2	3	2	3

S. Y. MSc. (Information Technology)

Course Code: IT- 526 **Course Title:** Research Project

Course Outcomes (COs):

CO1: Apply critical thinking skills to identify and define research problems.

CO2: Apply foundational research methodologies to design and conduct experiments/studies.

CO3: Demonstrate planning, time management, and project execution skills.

CO4: Analyze data and synthesize meaningful research findings.

CO5: Report research findings effectively in written and oral forms.

CO6: Use modern tools, technologies, and software for implementation and analysis.

CO7: Undertake independent research and contribute innovative solutions to real-world problems.

Program Outcomes (POs):

PO1: Apply computing knowledge to solve real-world problems.

PO2: Analyze problems and design appropriate solutions.

PO3: Design and develop systems/software solutions.

PO4: Use modern tools and technologies effectively.

PO5: Conduct experiments, analyze data, and interpret results.

PO6: Understand professional, ethical, and societal responsibilities.

PO7: Engage in lifelong learning and independent research.

CO–PO Mapping Matrix: (3 = High**, 2** = Medium**, 1** = Low, **Blank** – No relation**)**

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	1	1	2	2	2
CO2	3	3	2	2	3	1	2
CO3	2	2	2	2	2	2	3
CO4	3	3	2	2	3	1	2
CO5	2	2	2	1	2	3	2
CO6	3	2	3	3	2	1	2
CO7	3	3	3	2	3	2	3

Department of English

DSC-ENG-111&121(A): Introduction to Short Stories & Prose

Course Outcomes (COs)

1. CO1: Identify the short story as a form of literature.
2. CO2: Identify the prose as a form of literature.
3. CO3: Understand the language and style used by the author.
4. CO4: Differentiate between day-to-day language and literary language.

Program Outcomes (POs)

1. PO1: Acquaint students with the genre of short stories.
2. PO2: Enable students to understand the literary form of prose.
3. PO3: Develop understanding of literature and reading skills.
4. PO4: Help students learn the difference between day-to-day language and literary language.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	3	1	2	1
CO2	1	3	2	1
CO3	1	1	3	2
CO4	1	1	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Identify short story) has a strong relation to PO1 (Acquaint with short stories).
- CO2 (Identify prose) has a strong relation to PO2 (Understand literary form of prose).
- CO3 (Understand language and style) has a strong relation to PO3 (Develop understanding of literature).
- CO4 (Differentiate between day-to-day and literary language) has a strong relation to PO4 (Learn difference between day-to-day and literary language).

F.Y.B.A.-Optional English, OENG-101&102 Syllabus (w.e.f.22-23) Core Course DSC-1 ENG A&B, Introduction to Literature: Short story and Poetry.

Course Outcomes (COs)

1. Understand forms, elements, and types of literary genres (short story and poetry).
2. Appreciate literature and its forms.
3. Analyze literature as an expression of human values within a historical and social context.
4. Differentiate between day-to-day language and literary language.

Program Outcomes (POs)

1. Develop an understanding of literary genres and their significance.
2. Cultivate critical thinking and analytical skills through literary analysis.
3. Appreciate the aesthetic and cultural value of literature.
4. Enhance communication skills through the study of literature.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	2	1
CO3	2	3	2	1
CO4	1	2	1	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Understand literary genres) has a strong relation to PO1 (Develop understanding of literary genres).
- CO2 (Appreciate literature) has a strong relation to PO3 (Appreciate aesthetic and cultural value).
- CO3 (Analyze literature) has a strong relation to PO2 (Cultivate critical thinking).
- CO4 (Differentiate language) has a strong relation to PO4 (Enhance communication skills).

Course Objectives S.Y.B.A. DSC(IKS)& OJT ENG 213&223 Traditions in Indian Literature & On Job training/ Internship

Objectives of the Course-

1) Understand the literary, cultural and philosophical foundations of Indian literature through classical, medieval and regional traditions.

2) To enable students to explore major literary forms, aesthetics and narrative techniques in Indian texts

3) Enable students to examine the role of spirituality, devotion and ethics in shaping literary themes,especially in Bhakti and Buddhist traditions.

4) To enable students to recognise and appreciate voices of women in traditional Indian literature.

5) To enable students to develop analytical skills to interpret Indian literary texts in their historical and cultural contexts.

Outcomes of the Course-

1) Recall key concepts in Indian literary traditions such as Kavya,Rasa and Bhakti.

2) Explain classical aesthetic theories and literary genres in Sanskrit and regional language and literature.

3) Identify and classify major Indian literary movements and representative texts from various languages and periods.

4) Analyse devotional and ethical dimensions in Bhakti and Buddhist literally works.

5) Interpret selected texts(e.g., Therigatha, Tukaram's Abhangs) with attention to voice, form and historical context.

6) Evaluate the significance of women's contributions to Indian literary traditions across languages and eras.

CO-PO Mapping for Compulsory English Class -SYBA

Course Outcomes (COs)

1. CO1: Create interest for reading literature among students.
2. CO2: Develop reading and grasping skills among students.
3. CO3: Inculcate values for learning quality life among students.
4. CO4: Enhance communication skills among students.

Program Outcomes (POs)

1. PO1: Inculcate value education for quality life.
2. PO2: Comprehend worldly wisdom and commercial perception for success and quality life.

CO-PO Mapping

COs	PO1	PO2
CO1	2	1
CO2	2	1
CO3	3	2
CO4	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO3 (Inculcate values for learning quality life) has a strong relation to PO1 (Inculcate value education for quality life) as both focus on value education.
- CO4 (Enhance communication skills) has a strong relation to PO2 (Comprehend worldly wisdom and commercial perception) as effective communication is crucial for success.
- CO1 and CO2 have a moderate relation to both POs, as reading literature and developing reading skills can contribute to value education and worldly wisdom.

CO-PO Mapping for DSE 2 A&B 18th & 19th Century English Literature Class- S.Y.B.A.

Course Outcomes (COs)

1. CO1: Impart basic ideas about 18th and 19th century English literature.
2. CO2: Make students aware of literary history, salient features, socio-political and cultural background.
3. CO3: Help students grasp content and critically appreciate prescribed texts.
4. CO4: Inculcate a liking for Romantic and Victorian literature.

Program Outcomes (POs)

1. PO1: Acquaint students with the rich legacy of English literature.
2. PO2: Open up traditional job opportunities.
3. PO3: Comprehend worldly wisdom and commercial perception for success.

CO-PO Mapping

COs	PO1	PO2	PO3
CO1	3	1	1
CO2	3	1	2
CO3	3	2	2
CO4	3	1	2

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1, CO2, CO3, and CO4 have a strong relation to PO1 (Acquaint students with the rich legacy of English literature) as they all contribute to understanding English literature.
- CO3 (Grasp content and critically appreciate texts) has a moderate relation to PO2 (Open up traditional job opportunities) and PO3 (Comprehend worldly wisdom) as critical thinking and appreciation can enhance job prospects and worldly wisdom.
- CO2 and CO4 have a moderate relation to PO3 (Comprehend worldly wisdom) as understanding literary history and appreciating literature can contribute to worldly wisdom.

Paper- Generic Elective Course GE-1(A&B) GE ENG.A&B: Film and Literature Class- T.Y.B.A.

Course Outcomes (COs)

1. Understand the concept of film and its origin and development.
2. Analyze similarities and differences between film and literature.
3. Explore the process of adaptation and interaction with other cultural forms.
4. Analyze and judge film as an adaptation of literary text.
5. Comprehend the art of cinema making from a literary perspective.

Program Outcomes (POs)

1. Understand the concept of film and its development.
2. Analyze the relationship between film and literature.
3. Develop critical thinking skills to evaluate film adaptations.
4. Appreciate the art of cinema making and its cultural significance.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	3	1	1	1
CO2	1	3	2	1
CO3	1	2	3	2
CO4	1	2	3	2
CO5	1	1	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.

3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Understand film concept) has a strong relation to PO1 (Understand film concept).
- CO2 (Analyze film-literature similarities) has a strong relation to PO2 (Analyze film-literature relationship).
- CO3 and CO4 (Explore adaptation and analyze film) have a strong relation to PO3 (Develop critical thinking skills).
- CO5 (Comprehend cinema making) has a strong relation to PO4 (Appreciate art of cinema making).

CO-PO Mapping for DSE 3 ENG A&B: Twentieth Century English Literature Class- T.Y.B.A.

Course Outcomes (COs)

1. CO1: Explain the development of poetry in English.
2. CO2: Acquaint students with features and types of modern poetry, drama, and novel.
3. CO3: Introduce students to major poets, novelists, and dramatists in modern English literature.

Program Outcomes (POs)

1. PO1: Introduction to poetry and its development stages.
2. PO2: Acquaintance with features and types of modern poetry, drama, and novel.
3. PO3: Introduction to major English poets, novelists, and dramatists.
4. PO4: Development of poetic analysis and appreciation skills.
5. PO5: Study of representative writers to understand their style and culture.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	1
CO2	2	3	2	2	2
CO3	2	2	3	1	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Explain development of poetry) has a strong relation to PO1 (Introduction to poetry and its development stages).
- CO2 (Acquaint with features and types) has a strong relation to PO2 (Acquaintance with features and types of modern literature).
- CO3 (Introduce major writers) has a strong relation to PO3 (Introduction to major English writers) and PO5 (Study of representative writers).
- CO1, CO2, and CO3 have moderate relations to PO4 (Development of poetic analysis and appreciation skills) as understanding poetry and writers can contribute to analysis skills.

CO-PO Mapping for DSE 4 ENG A&B: The Study of English Language Class- T.Y.B.A.

Course Outcomes (COs)

1. CO1: Introduce properties, styles, and varieties of English language.
2. CO2: Acquaint students with grammatical forms and functions.
3. CO3: Enable students to learn and practice morphological concepts and word formation.
4. CO4: Introduce basic concepts in semantics, lexis, and syntax.

Program Outcomes (POs)

1. PO1: Knowledge of speech sounds, phonetics, accent, intonation, rhythm, morphology, and recent linguistic trends.
2. PO2: Develop ability to understand communication and interpretation processes.

CO-PO Mapping

COs	PO1	PO2
CO1	2	2
CO2	2	3
CO3	3	2
CO4	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO3 (Morphological concepts and word formation) has a strong relation to PO1 (Knowledge of morphology and linguistic trends).
- CO2 (Grammatical forms and functions) and CO4 (Semantics, lexis, and syntax) have a strong relation to PO2 (Develop ability to understand communication and interpretation) as understanding grammar and linguistic concepts is crucial for effective communication.
- CO1 (Properties, styles, and varieties) has a moderate relation to both POs, as understanding language properties can contribute to knowledge of linguistic trends and communication skills.

CO-PO Mapping for RP ENG-516&525: Research Project I&II

Course Outcomes (COs)

1. CO1: Understand and define specific research problem.
2. CO2: Apply subject knowledge to frame research objectives.
3. CO3: Identify and plan research question.
4. CO4: Prepare research design.
5. CO5: Remember and internalize research documentation style.
6. CO6: Plan and implement research project.
7. CO7: Design, analyze, and present research.
8. CO8: Evaluate research methodology and writing.
9. CO9: Implement and apply research.

Program Outcomes (POs)

1. PO1: Define clear research problem or topic.
2. PO2: Know relevance of proposed study.
3. PO3: Identify appropriate methodologies.
4. PO4: Articulate potential contributions.
5. PO5: Prepare research project outline.
6. PO6: Develop systematic research documentation style.
7. PO7: Foster intellectual curiosity.
8. PO8: Develop research skills.
9. PO9: Find solutions through rational research methodology.
10. PO10: Inculcate research methodology applications.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	1	1	1	1	1
CO2	2	3	2	2	1	1	1	1	1	1
CO3	2	2	3	1	1	1	1	1	1	1
CO4	1	1	2	2	3	1	1	1	1	1
CO5	1	1	1	1	1	3	1	1	1	1
CO6	1	1	1	1	1	1	2	3	1	1
CO7	1	1	1	1	1	1	2	3	1	1
CO8	1	1	2	1	1	1	1	1	3	2
CO9	1	1	1	1	1	1	1	1	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to *PO*.

Explanation:

- CO1 (Define research problem) has a strong relation to PO1 (Define clear research problem).
- CO2 (Apply subject knowledge) has a moderate to strong relation to PO2 (Know relevance of proposed study) and PO3 (Identify appropriate methodologies).
- CO3 (Identify research question) has a strong relation to PO3 (Identify appropriate methodologies).
- CO4 (Prepare research design) has a strong relation to PO5 (Prepare research project outline).
- CO5 (Research documentation style) has a strong relation to PO6 (Develop systematic research documentation style).

- CO6 and CO7 (Plan, implement, design, and analyze research) have a strong relation to PO8 (Develop research skills).
- CO8 (Evaluate research methodology) has a strong relation to PO9 (Find solutions through rational research methodology).
- CO9 (Implement and apply research) has a strong relation to PO10 (Inculcate research methodology applications).

CO-PO Mapping for DSC-3&4 ENG-515&524(A): Gender Studies I&II Class - M.A. Part II

Course Outcomes (COs)

1. CO1: Understand the historical background and emergence of Gender Studies.
2. CO2: Apply conceptual understanding of key terms and concepts related to gender.
3. CO3: Analyze and interpret literary texts through a gender lens.
4. CO4: Critically examine the intersection of gender with social institutions.

Program Outcomes (POs)

1. PO1: Provide understanding of the historical background and emergence of Gender Studies.
2. PO2: Develop conceptual understanding of key terms and concepts related to gender.
3. PO3: Analyze and interpret literary texts through a gender lens.
4. PO4: Examine the intersection of gender with social institutions.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	3	1	1	1
CO2	1	3	2	2
CO3	1	2	3	2
CO4	1	2	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Historical background) has a strong relation to PO1 (Understanding of historical background).
- CO2 (Conceptual understanding) has a strong relation to PO2 (Conceptual understanding of key terms).
- CO3 (Literary analysis) has a strong relation to PO3 (Analyzing literary texts through a gender lens).
- CO4 (Intersection with social institutions) has a strong relation to PO4 (Examining intersection with social institutions).

CO-PO Mapping for DSC 1&2 ENG-415&425(B): Cultural Studies

Course Outcomes (COs)

1. CO1: Demonstrate understanding of key concepts and theories in cultural studies.
2. CO2: Analyze and critically evaluate cultural artifacts, practices, and texts.
3. CO3: Examine the relationship between culture, society, and identity.
4. CO4: Appreciate the value of cultural diversity and engage in cross-cultural dialogue.

Program Outcomes (POs)

1. PO1: Provide comprehensive understanding of key concepts and theories in cultural studies.
2. PO2: Develop critical thinking skills and analytical abilities in relation to cultural phenomena.
3. PO3: Explore complex interconnections between culture, society, and identity.
4. PO4: Foster appreciation for cultural diversity and promote intercultural dialogue.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	3	2	2	1
CO2	2	3	2	2
CO3	2	2	3	2
CO4	1	2	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Key concepts and theories) has a strong relation to PO1 (Comprehensive understanding of

key concepts).

- CO2 (Critical evaluation) has a strong relation to PO2 (Critical thinking skills).
- CO3 (Culture, society, and identity) has a strong relation to PO3 (Interconnections between culture, society, and identity).
- CO4 (Cultural diversity and dialogue) has a strong relation to PO4 (Appreciation for cultural diversity and intercultural dialogue).

CO-PO Mapping for DSC-1&5 ENG-411&421: Literary Theory and Criticism Class - M.A.Part I

Course Outcomes (COs)

1. CO1: Demonstrate understanding of foundational concepts and principles of literary criticism.
2. CO2: Apply different critical approaches to analyze and interpret literary texts.
3. CO3: Recognize and evaluate the impact of different critical perspectives.
4. CO4: Employ analytical and interpretive skills to examine literary texts.

Program Outcomes (POs)

1. PO1: Familiarize students with foundational concepts and principles of literary theory.
2. PO2: Introduce students to a range of critical approaches and their application.
3. PO3: Enhance students' knowledge of literary criticism's influence on interpretation.
4. PO4: Develop students' analytical and interpretive skills in relation to literature.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	3	2	2	1
CO2	2	3	2	2
CO3	2	2	3	2
CO4	1	2	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Foundational concepts) has a strong relation to PO1 (Familiarize with foundational concepts).
- CO2 (Critical approaches) has a strong relation to PO2 (Introduce critical approaches).
- CO3 (Impact of critical perspectives) has a strong relation to PO3 (Influence of literary criticism).
- CO4 (Analytical and interpretive skills) has a strong relation to PO4 (Develop analytical and interpretive skills).

CO-PO Mapping for DSC-4 & 8 ENG-414 & 424: An Introduction to Linguistics

I&II Class - M.A.Part I

Course Outcomes (COs)

1. CO1: Identify essential properties of language and its role in human communication.
2. CO2: Comprehend the dynamic interaction between language and society.
3. CO3: Apply knowledge of language orientation, linguistic diversity, and grammar.
4. CO4: Demonstrate understanding of syntax, including its meaning and role.
5. CO5: Comprehend the nature and significance of semantics and pragmatics.

Program Outcomes (POs)

1. PO1: Familiarize students with various approaches to study language.
2. PO2: Introduce students to the linguistic framework for understanding language and society.
3. PO3: Equip students with comprehensive understanding of communicative grammar.
4. PO4: Provide students with comprehensive understanding of syntax.
5. PO5: Introduce students to basic concepts of semantics and pragmatics.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	1
CO2	2	3	1	1	1
CO3	2	2	3	2	1
CO4	1	1	2	3	1
CO5	1	1	1	1	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.

3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Essential properties of language) has a strong relation to PO1 (Familiarize with approaches to study language).
- CO2 (Language and society) has a strong relation to PO2 (Linguistic framework for language and society).
- CO3 (Language orientation and grammar) has a strong relation to PO3 (Communicative grammar).
- CO4 (Syntax) has a strong relation to PO4 (Comprehensive understanding of syntax).
- CO5 (Semantics and pragmatics) has a strong relation to PO5 (Basic concepts of semantics and pragmatics)

CO-PO Mapping for DSC 9&13 ENG 511&521: Post Colonial Literature I&II

Course Outcomes (COs)

1. CO1: Comprehensive understanding of postcolonial literature.
2. CO2: Articulate historical, political, and socio-cultural contexts.
3. CO3: Apply postcolonial theories to analyze literary texts.
4. CO4: Analyze structure, themes, and narrative techniques.
5. CO5: Critically evaluate effectiveness of postcolonial literature.

Program Outcomes (POs)

1. PO1: Recall key themes, authors, and literary works.
2. PO2: Acquaint with historical, political, and socio-cultural contexts.
3. PO3: Apply postcolonial theories to interpret literary texts.
4. PO4: Critically examine structure, themes, and narrative techniques.
5. PO5: Acquaint with significance and effectiveness of postcolonial literature.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	1
CO2	2	3	2	1	1
CO3	1	2	3	2	2
CO4	1	1	2	3	2
CO5	1	1	2	2	3

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Comprehensive understanding) has a strong relation to PO1 (Recall key themes and authors).
- CO2 (Historical contexts) has a strong relation to PO2 (Acquaint with historical contexts).
- CO3 (Applying postcolonial theories) has a strong relation to PO3 (Apply postcolonial theories).
- CO4 (Analyzing structure and themes) has a strong relation to PO4 (Critically examine structure and themes).
- CO5 (Evaluating effectiveness) has a strong relation to PO5 (Significance and effectiveness of postcolonial literature).

OE-1&2 ENG-114&124: Studies in English Literature and Language I&II

Course Outcomes (COs)

1. CO1: Learn moral and ethical values through stories and poems.
2. CO2: Imbibe and implement tenets of tolerance and simplicity.
3. CO3: Enhance vision by learning life stories of great personalities.
4. CO4: Improve writing skills through grammar and composition.

Program Outcomes (POs)

1. PO1: Encourage universal brotherhood and humanity.
2. PO2: Understand futilities of war.
3. PO3: Learn human values and moral lessons.
4. PO4: Boost confidence in writing skills.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	2	1	3	1
CO2	3	1	2	1
CO3	2	1	2	1
CO4	1	1	1	1

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1 (Learn moral and ethical values) has a strong relation to PO3 (Learn human values and

moral lessons).

- CO2 (Imbibe and implement tenets of tolerance and simplicity) has a strong relation to PO1 (Encourage universal brotherhood and humanity).
- CO3 (Enhance vision) has a moderate relation to PO1 (Encourage universal brotherhood and humanity) and PO3 (Learn human values and moral lessons).
- CO4 (Improve writing skills) has a strong relation to PO4 (Boost confidence in writing skills).

CO-PO Mapping for Communicative English Class - S.Y.B.Sc.

Course Outcomes (COs)

1. CO1: Train students to use English language for career purposes.
2. CO2: Motivate students to write persuasively in English.
3. CO3: Help students use English language for academic and vocational purposes.

Program Outcomes (POs)

1. PO1: Development of research aptitude and confidence.
2. PO2: Enhance job opportunities and research skills.
3. PO3: Improve interaction between students and teachers.
4. PO4: Inculcate research aptitude and boost confidence.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4
CO1	2	3	2	2
CO2	2	3	2	2
CO3	2	3	2	2

Mapping Levels:

1. *1 (Low)*: CO has a slight relation to PO.
2. *2 (Medium)*: CO has a moderate relation to PO.
3. *3 (High)*: CO has a strong relation to PO.

Explanation:

- CO1, CO2, and CO3 have a strong relation to PO2 (Enhance job opportunities and research skills) as effective communication in English is crucial for career success.
- CO1, CO2, and CO3 have a moderate relation to PO1 (Development of research aptitude and confidence), PO3 (Improve interaction between students and teachers), and PO4 (Inculcate research aptitude) as communication skills can contribute to research confidence, interaction, and aptitude.

S.Y.B.Sc. OE-ENG 215&225: Studies in English Literature and Language III&IV

Objectives of the Course:

1) Introduce students to major short stories in world literature representing varied human experiences.

2) Enhance literary appreciation through close reading and interpretation of selected prose texts.

3) Strengthen understanding of grammar components essential for effective communication.

4) Train students to form and transform different types of questions and reported spooch accurately.

5) Develop written composition skills through grammatically correct sentence structures and expressions.

6)Understand and appreciate diverse literary texts from Indian and Western traditions.

7) Identify themes, narrative techniques, and character development in short stories.

8) Recognize and classify different methods of word formation in English.

9) Analyze the structure and function of words created through various morphological processes.

10) Enhance vocabulary and linguistic awareness through applied language exercises.

Outcomes of the Course-

1)Recall and summarize plot, characters, and central themes in short stories in English.

2)Explain the moral and philosophical dimensions of the prescribed stories. 3)Identify grammatical structures such as Wh-questions, Yes-No questions, and question tags.

4)Apply rules of reported speech in transforming direct to indirect speech and vice versa.

5)Construct grammatically correct questions and responses for real-life communication scenarios.

6) Develop interpretative responses to literature through written and oral expression.

7) Recall the plots, characters, and settings of selected literary texts.

8) Explain the moral, social, and thematic concerns reflected in the short stories.

9) Analyze the narrative techniques used by short story writers in English.

10) Identify and categorize major and minor types of word formation in English.

11) Apply word formation rules to generate new and context-appropriate vocabulary.

12) Compare the use of different word formation processes in real-world communication

13) Create examples of words using prefixation, suffixation, blending, clipping, and acronym formation.

Department of Physics

F.Y.B. Sc. Physics Course

PHY 101: Basic Mechanics

(Semester I)

June 2018-19 to 2023-24

Course description:

This course is aimed at introducing the concepts of Basic Mechanics to Under Graduate students.

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

CO1. Apply the concept and knowledge of Basic Mechanics to understand and solve real life problems.

CO2. Understanding of the course will create scientific temperament.

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. To impart knowledge of basic concepts in Basic Mechanics.

PO2. To provide the knowledge and methodology necessary for solving problems in Physics.

PO3. The course also involves the related experiments based on the theory.

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO/PO	PO1	PO2	PO3
CO1	3	3	2
CO2	2	2	3

Step 4: Interpretation of CO-PO Mapping:

CO1: PO1, PO2, PO3:

CO1 is **strongly aligned** with **PO1** and **PO2** because applying basic mechanics to real-life problems directly builds conceptual knowledge (PO1) and enhances problem-solving

methodologies (PO2). It has a **moderate contribution** to **PO3** because real-life applications often require experimental validation but not always in equal depth.

CO2: PO1, PO2, PO3:

CO2 contributes **moderately** to **PO1** and **PO2** because developing scientific temperament indirectly strengthens conceptual understanding and problem-solving ability.It has a **high contribution** to PO3 as fostering scientific temperament often involves hands-on experiments and practical exposure.

F.Y.BSc. Physics Course

PHY 102: Dynamics and Properties of Matter

(Semester I)

June 2018-19 to 2023-24

Course description:

This course is aimed at introducing the concepts of Dynamics and Properties of Matter to under Graduate students.

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

CO1: Apply the concept and knowledge of Dynamics and Properties of Matter to understand and

solve real life problems.

CO2:. Understanding of the course will create scientific temperament.

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. To impart knowledge of basic concepts in Dynamics and Properties of Matter.

PO2. To provide the knowledge and methodology necessary for solving problems in Physics.

PO3. The course also involves the related experiments based on the theory.

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO/PO	PO1	PO2	PO3
CO1	3	3	2
CO2	2	1	2

Step 4: Interpretation of CO-PO Mapping:

CO1 → PO1, PO2, PO3:

CO1 is strongly aligned with **PO1** because applying concepts of Dynamics and Properties of Matter directly supports foundational knowledge. It has strong contribution with **PO2** because solving real-life problems requires using methodologies and problem-solving skills.

The link between CO1 and **PO3** is moderate, as experimental work supports but is not central to CO1.

CO2 → PO1, PO2, PO3:

CO2, which aims to develop a scientific temperament, has a moderate link with **PO1**. Although PO1's focus on conceptual knowledge supports this goal, scientific temperament extends beyond just concepts, resulting in a moderate alignment. Its connection to **PO2** is low, as it emphasizes attitude over technical problem-solving. CO2 moderately aligns with **PO3**, as lab work nurtures scientific temperament but is not its primary focus.

F.Y.BSc. Physics Course

PHY 201: Electricity and Electrostatics

(Semester II)

June 2018-19 to 2023-24

Course description:

This course is aimed at introducing the concepts of Electricity and Electrostatics to Under Graduate students.

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

CO1: Apply the concept and knowledge of Electricity and Electrostatics to understand and solve real life problems.

CO2: Understanding of the course will create scientific temperament.

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. To impart knowledge of basic concepts in Electricity and Electrostatics.

PO2. To provide the knowledge and methodology necessary for solving problems in Physics.

PO3. The course also involves the related experiments based on the theory.

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO/PO	PO1	PO2	PO3
CO1	3	3	2
CO2	2	1	2

Step 4: Interpretation of CO-PO Mapping:

CO1 → PO1, PO2, PO3:

CO1 strongly supports PO1 by providing conceptual knowledge in electricity and electrostatics, while also strongly contributing to PO2 by developing skills for solving physics-

related problems. Its link to PO3 is moderate, as understanding real-life problems may involve experiments but is not the primary focus.

CO2 → PO1, PO2, PO3:

CO2 moderately contributes to PO1, as building a scientific temperament requires conceptual understanding, but offers minimal contribution to PO2 since it does not focus on structured problem-solving. CO2 has a moderate link to PO3, as scientific temperament often develops through experimental work and observation.

F.Y.BSc. Physics Course

PHY 202: Dielectrics, Magnetism and Electromagnetism

(Semester II)

June 2018-19 to 2023-24

Course description:

This course is aimed at introducing the concepts of Dielectrics, Magnetism and Electromagnetism to Under Graduate students.

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

CO1: Apply the concept and knowledge of Dielectrics, Magnetism and Electromagnetism to understand and solve real life problems.

CO2: Understanding of the course will create scientific temperament.

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. To impart knowledge of basic concepts in Dielectrics, Magnetism and Electromagnetism.

PO2. To provide the knowledge and methodology necessary for solving problems in Physics.

PO3. The course also involves the related experiments based on the theory.

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO/PO	PO1	PO2	PO3
CO1	3	3	2
CO2	2	1	2

Step 4: Interpretation of CO-PO Mapping:

CO1 → PO1, PO2, PO3:

CO1 has a strong correlation with **PO1** as it focuses on understanding dielectrics, magnetism, and electromagnetism, and a strong link with **PO2** due to the need for systematic problem-

solving skills in applying these concepts to real-life problems, while showing a moderate link with **PO3** as experimental work supports understanding but is not the primary objective.

CO2 → PO1, PO2, PO3:

CO2 has a moderate correlation with **PO1** since conceptual knowledge is necessary for building scientific temperament. It has low impact with **PO2** as it focuses on attitude rather than technical problem-solving, and a moderate connection with **PO3** as scientific temperament can be nurtured through experimental and lab work.

F.Y.BSc. Physics Course NEP 2020

PHY-111: Physics Principles and Applications-I

Semester I, 2024-25

Here is the Course Outcome (CO) and Program Outcome (PO) Correlation Table for the F.Y.BSc. Chemistry Course (**PHY-111: Physics Principles and Applications-I**) NEP 2020 Sem I is given. This shows how each CO contributes to different POs.

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

• Understand the basic physics principles in the field of current electricity, electric circuit analysis, electromagnetism and optics,

CO1: Apply these principles in understanding applications of these principles,

CO2: Apply the knowledge gained, in solving some simple problems based on these principles,

CO3: Analyze a problem/situation to understand the basic physics principles involved in it.

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. To impart to the students, knowledge about the basic physics principles in the field of current electricity, electric circuit analysis, electromagnetism and optics,

PO2. To discuss the applications which are based on these basic principles,

PO3. To nurture curiosity in students about Physics and its applications

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO \ PO	PO1	PO2	PO3
CO1	3	3	2
CO2	3	3	2
CO3	3	2	3

Step 4: Interpretation of CO-PO Mapping:

CO1 → PO1, PO2, PO3:

CO1 has a strong alignment with PO1 and PO2 as it focuses on applying fundamental principles, directly supporting conceptual understanding (PO1) and their applications (PO2). CO1 shows moderate alignment with PO3 since applying principles fosters curiosity but is not its primary goal.

CO2 → PO1, PO2, PO3:

CO2 has a strong link with PO1 and PO2 because solving problems requires both conceptual knowledge and understanding of applications, while it has a moderate contribution to PO3, as problem-solving can encourage curiosity indirectly.

CO3→ PO1, PO2, PO3:

CO3 exhibits a strong relationship with PO1 and PO3, as analysis-based learning deepens conceptual knowledge (PO1) and actively nurtures curiosity (PO3), with a medium alignment to PO2 since analyzing a problem may include applications but not as directly as CO1.

F.Y.BSc. Physics Course NEP 2020

PHY-111: Physics Principles and Applications-II

Semester II, 2024-25

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

CO1: Understand the basic physics principles in the field of gravitation, fluids, sound and Semiconductors.

CO2: Apply these principles in understanding applications of these principles,

CO3: Apply the knowledge gained, in solving some simple problems based on these

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. To impart to the students, knowledge about the basic physics principles in the field of gravitation, fluids, sound and semiconductors,

PO2. To discuss the applications which are based on these basic principles,

PO3. To nurture curiosity in students about Physics and its applications

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO / PO	PO1	PO2	PO3
CO1	3	2	2
CO2	3	3	2
CO3	3	3	2

Step 4: Interpretation of CO-PO Mapping:

CO1 → PO1, PO2, PO3:

The relationship between CO1 and PO1 is one of strong correlation, as CO1 directly focuses on acquiring knowledge of basic principles. CO1 shows a moderate alignment with PO2, as understanding basic concepts contributes to recognizing applications but not fully applying them yet. There is also a

moderate link between CO1 and PO3, where conceptual understanding can trigger curiosity, though it is not explicitly designed for that purpose.

CO2 → PO1, PO2, PO3:

CO2 has a strong connection with PO1, since applying principles requires thorough conceptual knowledge, and a high alignment with PO2, as CO2 explicitly deals with understanding real-world applications. Additionally, CO2 has a moderate link with PO3, as learning through applications fosters some curiosity.

CO3→ PO1, PO2, PO3:

CO3 demonstrates a strong contribution to both PO1 and PO2, as problem-solving consolidates both conceptual and application skills, while its link with PO3 is moderate, as problem-solving may develop curiosity but only indirectly.

F.Y.BSc. Physics Course NEP 2020

PHY-114: Materials in Today's World

Semester I, 2024-25

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

CO1: Define the possible states of matter and their basic properties.

CO2: Explain the chronological development that materials have gone through for achieving their present stage and importance of materials in development of human civilization

CO3: Compare and classify materials and explain their properties

CO4: Understand developments in advanced materials and their applications

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. The various states of matter and properties of solid state

PO2. The development of materials over the ages

PO3. The classification of materials and their properties

PO4. Advanced class of materials and their applications

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO \ PO	PO1	PO2	PO3	PO4
CO1	3	2	1	2
CO2	1	3	2	2
CO3	2	1	3	1
CO4	1	2	2	3

Step 4: Interpretation of CO-PO Mapping:

CO1 → PO1, PO2, PO3, PO4:

CO1 directly addresses defining the states of matter and their properties, which aligns strongly with **PO1**, as it focuses on understanding the various states of matter and properties

of the solid state. CO1 moderately contribute to the historical development of materials **(PO2)**, and advanced materials and applications **(PO4**). It provides minimal contribution to classification of materials **(PO3).**

CO2 → → PO1, PO2, PO3, PO4:

CO2 directly correlates with **PO2**, as it focuses on the historical development of materials and their role in human civilization. CO2 has low contribution to states of matter and their properties (**PO1**). It provides moderate contribution classification of materials (**PO3**), and advanced materials (**PO4**).

CO3→ → PO1, PO2, PO3, PO4:

CO3 strongly aligns with **PO3**, as it involves comparing and classifying materials and explaining their properties. It has a moderate contribution to **PO1**, as explaining material properties may indirectly relate to understanding the properties of the solid state.CO3 does not directly address the historical development of materials (**PO2**) or advanced materials and applications (**PO4**).

CO4 → PO1, PO2, PO3, PO4:

CO4 directly aligns with **PO4**, as it focuses on advanced materials and their applications. CO4 may contributed moderately to **PO2**, as understanding advanced materials could involve some reference to their historical development. It has contributed moderately to **PO3**, as advanced materials may involve some classification or property analysis.CO4 has minimal contribution to **PO1** because it does not directly address the states of matter or properties of the solid state (PO1).

F.Y.BSc. Physics Course NEP 2020

PHY-124 : **Energy**

Semester I, 2024-25

Step 1: Define Course Outcomes (COs)

Learner will be able to ….

CO1: Understand the availability of Renewable and Non-renewable Energy Sources.

CO2: Understand the significance of renewable energy sources and energy storage.

CO3: Make appropriate choice of energy source depending on usage pattern.

Step 2: Identify Relevant POs (Program Outcomes)

By the end of this program, students will be able to:

PO1. To know about the Indian and World Energy Scenario

PO2. To know about the Renewable and Non-renewable Energy Sources

PO3. To understand the various modes of Energy Storage

Step 3: CO-PO Correlation Matrix (with Grade 1 to 3)

Grade Key: **3** = High Contribution, **2** = Moderate Contribution, **1** = Low Contribution

CO / PO	PO1	PO2	PO3
CO1	2	3	1
CO2	1	3	3
CO3	2	3	3

Step 4: Interpretation of CO-PO Mapping:

CO1 → PO1, PO2, PO3:

CO1 has medium alignment with **PO1** (understanding global energy scenario helps in identifying sources).It has strong alignment with **PO2** (focuses directly on renewable and non-renewable energy availability) and low correlation with **PO3** since energy storage is not addressed here.

CO2 → PO1, PO2, PO3:

CO2 has high alignment with **PO2** because it emphasizes renewable sources. It has also strong alignment with **PO3** because it explicitly considers energy storage concepts. Low contribution to **PO1** because it is less about global/Indian scenario.

CO3 → PO1, PO2, PO3:

CO3 has medium alignment with **PO1** (choosing energy sources requires some knowledge of energy scenario). It has strong alignment with **PO2** (selection depends on understanding different sources) and **PO3** (decision-making involves storage and efficient usage understanding).

Department of Economics

FYBA - Economy of Maharashtra

Course Objectives (COs):

1. To aware students about the various issues of the Economy of Maharashtra.
2. To increase the understanding of Students agriculture and population Problems before Economy of Maharashtra.
3. Understand problems of local bodies in the Maharashtra state.
4. To prepare Student for Competitive exams.

Course Outcomes (COts):

1. Students will be able to discuss on various issues related to economy of Maharashtra.
2. Students will be able to understand basic knowledge of economy of Maharashtra.
3. Students will acquire knowledge on recent industrial development problems in
4. Maharashtra, and recent programs of industrial development.
5. Students will gain knowledge

CO-PO Mapping Table

Course Outcomes (COs)	PO1 Knowledge	PO2 Critical Thinking	PO3 Problem Analysis	PO4 Research Skills	PO5 Competitive Exam Readiness
CO1	3	2	1	1	2
CO2	3	3	2	2	2
CO3	2	3	3	1	2
CO4	2	2	1	1	3

Scale Used:

3 - High Correlation

2 - Moderate Correlation

1 - Low Correlation

T.Y.B.A- Indian Economy Since 1980 -III & IV

(ECONOMICS)

SEMESTER- V & VI

Paper course- No DSC -1 (E & F) Eco-351 & 361 : General Paper - 3rd

Course Objectives :

1. To enable students to have understanding the various issues of Indian Economy.
2. To develop the analysing capability in the context of current Indian Economic Problems.
3. To able the students for appearing the MPSC, UPSC and other competitive Examination

Course Outcomes (COs)

- After completing the course, students will be able to:
- **CO1:** Explain the structure, features and major issues of the Indian Economy.
- **CO2:** Analyse contemporary economic problems such as poverty, unemployment, inflation, and regional imbalance in India.

- **CO3:** Interpret government economic policies, planning strategies, and reforms in the Indian economy.
- **CO4:** Evaluate current economic developments and their impact on national growth and development.
- **CO5:** Apply their knowledge of Indian economic issues while preparing for competitive examinations such as MPSC, UPSC and other related exams.

CO-PO Mapping Table (Sample)

Course Outcomes	PO1 Knowledge	PO2 Analysis	PO3 Critical Thinking	PO4 Application	PO5 Competitive Readiness
CO1	3	2	1	1	2
CO2	2	3	3	2	2
CO3	2	3	2	2	2
CO4	2	3	3	2	3
CO5	1	2	2	3	3

S.Y.B.A. - Indian Economy Since 1980-I&II

SEMISTER-III&IV

Paper course no. DSC Eco 231 C & DSC Eco 241 Indian Economy Since 1980-I&II

Objectives of paper :

1. To enable students to have understanding the various issues of Indian Economy.
2. To develop the analysing capability in the context of current Indian Economic Problems.
3. To able the students for appearing the MPSC, UPSC and other competitive Examinations.

Course Outcomes (COs)

After completing the course, students will be able to:

- **CO1:** Explain the structure, features and major issues of the Indian Economy.
- **CO2:** Analyse current economic problems in India such as poverty, unemployment, inflation, and regional imbalance.
- **CO3:** Evaluate government policies and economic reforms related to the Indian economy.
- **CO4:** Develop analytical skills to interpret contemporary economic developments in India.

- **CO5:** Apply knowledge of the Indian economy while preparing for competitive examinations such as MPSC, UPSC and other related exams.

CO - Course Objective (CO) Mapping

Course Objectives	CO1	CO2	CO3	CO4	CO5
Obj 1: Understanding various issues of Indian Economy	3	2	2	2	1
Obj 2: Develop analysing capability regarding current economic problems	1	3	2	3	2
Obj 3: Prepare students for MPSC, UPSC and other competitive exams	1	2	2	2	3

Department of Political Science

FYBA

Programme Objectives (POs)

Course: Indian Political Thinkers (T.Y.B.A.)

1. **To introduce students to the evolution of political thought in India** from the pre-independence to post-independence period, focusing on major thinkers and traditions.
2. **To develop understanding of key political ideas** such as nationalism, democracy, social justice, and reform as articulated by Indian thinkers.
3. **To examine the contributions of prominent Indian political thinkers** like Dadabhai Naoroji, Bal Gangadhar Tilak, and Mahatma Gandhi in shaping modern Indian political discourse.
4. **To analyze the relationship between political ideas and social transformation** in the context of Indian society, including issues of caste, religion, and colonialism.
5. **To develop critical thinking and analytical skills** for evaluating different political ideologies and their relevance in contemporary India.
6. **To understand the diversity and plurality of political thought in India**, including competing perspectives on nationalism, governance, and development.
7. **To enable students to connect theoretical ideas with practical political processes**, such as freedom movement, constitutional development, and policy-making.
8. **To cultivate awareness about democratic values and social justice**, especially concerning marginalized and underrepresented groups in Indian society.
9. **To enhance research and interpretative skills** through the study of primary texts and scholarly interpretations of political thinkers.
10. **To prepare students for higher studies and competitive examinations** by strengthening conceptual clarity and analytical ability in political science.

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Explain the major ideas and contributions of key Indian political thinkers in historical context.

CO2: Analyze the concepts of nationalism, democracy, social justice, and reform as reflected in Indian political thought.

CO3: Evaluate the role of thinkers such as **Dadabhai Naoroji**, **Bal Gangadhar Tilak**, **Mahatma Gandhi**, and **B. R. Ambedkar** in shaping Indian political philosophy.

CO4: Examine the relationship between political thought and socio-economic issues like caste, religion, and colonialism in India.

CO5: Critically assess different ideological perspectives and their relevance in contemporary Indian politics.

CO6: Develop analytical and interpretative skills through the study of political texts and arguments.

CO–PO Mapping Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	-	-	-	-	2
CO2	3	3	2	1	1	-	-	2	-	2
CO3	3	3	2	2	1	-	-	2	-	2
CO4	2	3	2	3	2	-	-	3	-	1
CO5	2	3	3	2	3	-	-	2	1	2
CO6	1	2	3	2	3	-	-	1	3	2

Programme: B.A. – Journalism & Mass Communication

After completing the programme, students will be able to:

PO1: Disciplinary Knowledge

Acquire fundamental knowledge of journalism, mass communication, media systems, and related social sciences.

PO2: Critical Thinking & Analysis

Analyze media content, communication processes, and societal issues using critical and logical reasoning.

PO3: Communication Skills

Demonstrate effective written, verbal, and digital communication skills suitable for media professions.

PO4: Media Skills & Techniques

Apply practical skills in reporting, writing, editing, and basic media production.

PO5: Research Ability

Develop basic research skills including data collection, interpretation, and presentation in media studies.

PO6: Use of ICT & Digital Media

Use information and communication technologies and digital tools relevant to journalism and mass communication.

PO7: Ethics & Professional Responsibility

Understand and follow ethical standards, media laws, and professional responsibilities in journalism.

PO8: Social Responsibility & Citizenship

Recognize the role of media in democracy, social justice, and national development.

PO9: Lifelong Learning

Engage in continuous learning and adapt to changing media trends and technologies.

PO10: Employability & Entrepreneurship

Enhance employability skills and develop the ability for self-employment in media and communication sectors.

CO1: Explain the basic concepts, nature, and scope of journalism and mass communication.

CO2: Describe the structure and functioning of various media forms such as print, electronic, and digital media.

CO3: Analyze the role of media in society, including its impact on public opinion, democracy, and development.

CO4: Demonstrate basic skills in news writing, reporting, and editing.

CO5: Evaluate ethical issues and professional standards in journalism and mass communication.

CO6: Apply communication theories and concepts to real-life media situations.

CO–PO Mapping Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	-	-	-	-	2
CO2	3	2	2	1	2	-	-	-	-	2
CO3	3	3	2	2	2	-	-	3	-	2
CO4	2	2	3	2	3	-	-	2	2	2
CO5	2	3	2	3	2	-	-	3	-	2
CO6	2	3	3	2	2	-	-	2	1	2

Programme: B.A. (for courses like Indian Civil Services)

After completing the programme, students will be able to:

PO1: Disciplinary Knowledge

Understand core concepts of political science, public administration, history, and Indian governance.

PO2: Critical Thinking

Analyze socio-political and administrative issues with logical and evidence-based reasoning.

PO3: Communication Skills

Develop effective written and verbal communication for academic and competitive exam contexts.

PO4: Analytical & Problem Solving Skills

Interpret data, policies, and governance challenges and suggest solutions.

PO5: Research Skills

Apply basic research methods in analyzing public administration and governance issues.

PO6: ICT Application

Use digital tools and online resources for learning, analysis, and exam preparation.

PO7: Ethics & Integrity

Understand ethical values, integrity, and accountability in public services.

PO8: Social Responsibility

Recognize duties towards society, citizenship values, and inclusive development.

PO9: Lifelong Learning

Develop self-learning habits, especially for competitive examinations like UPSC/MPSC.

PO10: Employability & Career Orientation

Prepare for careers in civil services and related administrative fields.

Course Outcomes (COs)

Course: Indian Civil Services (T.Y.B.A.)

After completing this course, students will be able to:

CO1: Explain the structure, functions, and evolution of Indian Civil Services.

CO2: Describe the recruitment process, role, and significance of institutions like **Union Public Service Commission** and **Maharashtra Public Service Commission**.

CO3: Analyze the role of civil services in governance, policy implementation, and development.

CO4: Evaluate administrative challenges such as corruption, accountability, transparency, and reforms.

CO5: Assess the ethical responsibilities and values expected from civil servants.

CO6: Develop aptitude and awareness required for competitive examinations like UPSC/MPSC.

CO–PO Mapping Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	-	-	-	-	2
CO2	3	2	2	1	1	1	-	-	-	2
CO3	3	3	2	3	2	1	2	3	-	2
CO4	2	3	2	3	2	-	3	3	-	2
CO5	2	2	1	2	2	-	3	3	-	2
CO6	2	3	3	2	2	2	2	2	3	3

Programme: B.A. (Journalism / Political Science stream)

After completing the programme, students will be able to:

PO1: Disciplinary Knowledge

Understand core concepts of political science, journalism, and media studies.

PO2: Critical Thinking & Analysis

Analyze political events, policies, and media narratives using logical reasoning.

PO3: Communication Skills

Develop effective writing, reporting, and presentation skills in political contexts.

PO4: Media & Reporting Skills

Apply journalistic techniques in political reporting, news writing, and editing.

PO5: Research Skills

Conduct basic research on political issues and media content.

PO6: ICT & Digital Literacy

Use digital media tools and platforms for news production and dissemination.

PO7: Ethics & Professional Responsibility

Understand media ethics, objectivity, and responsibility in political journalism.

PO8: Social & Democratic Awareness

Recognize the role of media in democracy, governance, and public opinion.

PO9: Lifelong Learning

Adapt to evolving media trends and continuously upgrade knowledge.

PO10: Employability & Career Skills

Prepare for careers in journalism, media, and competitive examinations.

Course Outcomes (COs)

Course: Political Journalism (T.Y.B.A.)

After completing this course, students will be able to:

CO1: Explain the nature, scope, and significance of political journalism in democratic systems.

CO2: Describe the structure and functioning of political reporting in print, electronic, and digital media.

CO3: Analyze political news, election coverage, and policy reporting with critical perspective.

CO4: Demonstrate skills in writing political news reports, editorials, and opinion pieces.

CO5: Evaluate ethical issues such as bias, propaganda, fake news, and media responsibility in political journalism.

CO6: Apply knowledge of political systems and media practices to real-world journalistic situations.

CO–PO Mapping Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	-	-	2	-	2
CO2	3	2	2	2	1	2	-	2	-	2
CO3	3	3	2	2	2	2	2	3	-	2
CO4	2	2	3	3	2	2	1	2	1	3
CO5	2	3	2	2	2	1	3	3	-	2
CO6	2	3	3	2	2	2	2	2	2	3

Programme- Management And Good Governance

PO1: Disciplinary Knowledge

Understand concepts of governance, public administration, and management.

PO2: Critical Thinking

Analyze administrative systems, policies, and governance issues logically.

PO3: Communication Skills

Communicate effectively in administrative and professional contexts.

PO4: Problem Solving Ability

Identify governance challenges and suggest practical solutions.

PO5: Research Skills

Apply basic research methods in governance and management studies.

PO6: ICT & Digital Literacy

Use digital tools for governance, administration, and learning.

PO7: Ethics & Integrity

Understand ethical values, transparency, and accountability in governance.

PO8: Social Responsibility

Promote democratic values, inclusiveness, and public welfare.

PO9: Lifelong Learning

Develop continuous learning habits for personal and professional growth.

PO10: Employability & Leadership

Enhance leadership qualities and employability in administrative fields.

Course: Management and Good Governance (T.Y.B.A.)

After completing this course, students will be able to:

CO1: Explain the basic concepts of management and principles of good governance.

CO2: Describe key features of governance such as transparency, accountability, participation, and rule of law.

CO3: Analyze the role of institutions and policies in promoting good governance in India.

CO4: Evaluate governance challenges such as corruption, inefficiency, and lack of accountability.

CO5: Assess the importance of ethical values and leadership in public administration.

CO6: Apply governance principles in real-life administrative and policy contexts.

CO–PO Mapping Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	-	-	2	-	2
CO2	3	2	2	1	1	1	2	3	-	2
CO3	3	3	2	3	2	1	2	3	-	2
CO4	2	3	2	3	2	-	3	3	-	2
CO5	2	2	1	2	2	-	3	3	-	2
CO6	2	3	3	2	2	2	2	2	2	3