POLBA MAHAVIDYALAYA

Polba, Hooghly-712148

B.Sc. GENERAL (MATHEMATICS)

Session: 2022-2023

Program Outcome:

After completion of the B.Sc. General program, the students will be able to

PO No.	Program Outcomes
PO 1	Develop numerical and analytical skills and critical thinking that enable them to solve day-to-day problems
PO 2	Develop scientific, communicative, and numerical skills and make rewarding careers in science and education by facing challenging competitive exams.
PO 3	Gain scientific knowledge and skills that enable them to undertake further studies in an inter-disciplinary branch of science
PO 4	Apply scientific knowledge of principles, concepts, and results to their day-to-day life
PO 5	Enhance problem-solving skills

Programme Specific outcome

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

PSO1	Recall basic facts of mathematics and display knowledge of conventions such as notations, and terminology.
PSO2	Equipped with mathematical skills and techniques which can be applied in both academic and non-academic areas of work.
PSO3	Construct mathematical modeling of many physical phenomena.
PSO4	Face competitive examinations confidently using the acquired numerical skills and knowledge.
PSO5	Develop interest and a positive attitude towards mathematics as an interesting and valuable subject of study.

Course Structure: Semester-wise distribution of Courses

Semester	Course Code	Title	Credits
I	BMG1CC1A	Differential Calculus	6
II	BMG2CC1B	Differential Equations	6
III	BMG3CC1C	Real Analysis	6
IV	BMG4CC1D	Algebra	6
Discipline Specific Electives (DSE)			
Choices for DSE1A (Choose any one)			
V	BMG5DSE1A1	Matrices	6

	BMG5DSE1A2	Mechanics	6
	BMG5DSE1A3	Linear Algebra	6
Choices for DSE1B (Choose any one)
VI	BMG6DSE1B1	Numerical Methods	6
	BMG6DSE1B2	Complex Analysis	6
	BMG6DSE1B3	Linear Programming	6
Skill Enhancement Courses (SEC)
Choices for SEC1 (Choose any one)
III	BMG3SEC11	Logic and Sets	2
	BMG3SEC12	Analytical Geometry	2
	BMG3SEC13	Integral Calculus	2
Choices for SEC2 (Choose any one)
IV	BMG4SEC21	Vector Calculus	2
	BMG4SEC22	Theory of Equations	2
	BMG4SEC23	Number Theory	2
Choices for SEC3 (Choose any one)
V	BMG5SEC31	Probability and Statistics	2
	BMG5SEC32	Mathematical Finance	2
	BMG5SEC33	Mathematical Modeling	2
Choices for SEC4 (Choose any one)
VI	BMG6SEC41	Boolean Algebra	2
	BMG6SEC42	Transportaion and Game Theory	2
	BMG6SEC43	Graph Theory	2
	GRAND TOTAL		40

Semester-wise detailed syllabus

SEMESTER – I
Name of the Course: **Differential Calculus**
Course Code: **BMG1CC1A**
Full Marks: 75	Credit: 6
Number of classes required: 60

Course Objectives (BMG1CC1A)

The prime objectives of the course are:

- To introduce the students to the exciting world of differential calculus and its applications.
- Students will be able to use derivatives to explore the behaviour of a given function.
- Students will understand the information that the first and second derivatives of a function give you about that function. This includes locating and classifying its extrema, and graphing the function.

Course Outcomes (UMTMCC01)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Recall the idea of limit, continuity, and derivative and apply these in solving mathematical problems	PSO1
CO 2	Describe Leibnitz theorem and apply it to solve problems	PSO4
CO 3	Trace different types of curves and explain their characteristics	PSO4
CO 4	Describe and apply Taylor's, Maclaurin's series for various functions	PSO2

SEMESTER – II	
Name of the Course: **Differential Equations**	
Course Code: **BMG2CC1B**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG2CC1B)

The prime objectives of the course are:

- To make students understand that physical systems can be described by differential equations.
- To understand the practical importance of solving differential equations.
- To understand the differences between initial value and boundary value problems (IVPs and BVPs).

Course Outcomes (BMG2CC1B)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Formulate mathematical models of real-life scenarios using differential equations and solve it using different methods.	PSO3, PSO5
CO 2	Test the existence and uniqueness of a solution of a differential equation.	PSO4
CO 3	Classify different types of differential equations.	PSO1
CO 4	Solve problems of interdisciplinary branches like physics, computer science which are based on differential equations	PSO4, PSO5
CO5	Examination the convexity and concavity of a function	PSO2

SEMESTER – III	
Name of the Course: **Real Analysis**	
Course Code: **BMG3CC1C**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG3CC1C)

The prime objectives of the course are:

- Students will be able to describe the real line as a complete, ordered field.
- Learn to use the definitions of convergence as they apply to sequences, series, and functions.
- Students will be able to determine the continuity, differentiability, and integrability of functions defined on subsets of the real line.

Course Outcomes (BMG3CC1C)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	CO1 Explain the primary concepts of sets, sequences, and series of real Numbers.	PSO2
CO 2	Understand the concepts of convergence of sequences and series	PSO1
CO 3	Understand the importance of convergence of sequence and series	PSO1
CO 4	Find the sum of infinite terms with different methods using the concepts of sequence and series.	PSO4

SEMESTER – IV	
Name of the Course: **Algebra**	
Course Code: **BMG4CC1D**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG4CC1D)

The prime objectives of the course are:

- Students will recognize and use properties of real numbers.
- They will perform basic arithmetic operations on algebraic expressions and simplify algebraic expressions involving exponents and radicals.

Course Outcomes (BMG4CC1D)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Learn the basic concepts of countable sets, metric space, connectedness, and compactness of metric spaces, which are the backbone of real analysis.	PSO5
CO 2	Understand the techniques and examples in analysis, helps them to be well-prepared for courses like Topology, Measure theory and Functional analysis.	PSO3
CO 3	Using the concept of sequence and series find the sum of infinite terms with different methods.	PSO2

CO 4	Differentiate continuous functions and uniformly continuous functions.	PSO2
CO5	Understand iterative numerical methods to find the roots of an equation, which are based on the concept of sequence.	PSO4
CO6	Explain the applicability of mathematical models using the concepts of real analysis.	PSO1

Discipline Specific Electives (DSE)
Choices for DSE1A (Choose any one)

SEMESTER – V	
Name of the Course: **Matrices**	
Course Code: **BMG5DSE1A1**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG5DSE1A1)

The prime objectives of the course are:

- Work with matrices and determine if a given square matrix is invertible.
- Learn to solve systems of linear equations and application problems requiring them.
- Learn to compute determinants and know their properties.
- Learn to find and use eigenvalues and eigenvectors of a matrix.
- Learn about and work with vector spaces and subspaces.

Course Outcomes (BMG5DSE1A1)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Find the inverse of a square matrix.	PSO3
CO 2	Solve the matrix equation Ax = b using row operations and matrix operations.	PSO2, PSO4
CO 3	Find the determinant of a product of square matrices, of the transpose of a square matrix, and of the inverse of an invertible matrix.	PSO3
CO 4	Find the characteristic equation, eigenvalues and corresponding eigenvectors of a given matrix.	PSO1, PSO5
CO 5	Determine if a given matrix is diagonalizable.	PSO3

SEMESTER – V	
Name of the Course: **Mechanics**	
Course Code: **BMG5DSE1A2**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG5DSE1A2)

The prime objectives of the course are:

- Understand the various concepts of physical quantities and the related effects on different bodies using mathematical techniques.
- Emphasize knowledge building for applying mathematics in the physical world.
- To understand the concept of different forces and moments and their equilibrium concerning a coordinate system.
- To widen appreciation of the variety of phenomena covered by mechanics and the techniques available to handle them.

Course Outcomes (BMG5DSE1A2)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Understand the virtual work, stable and unstable equilibrium.	PSO5
CO 2	Solve the problems on the stability of near orbit, motion in a particle in 3D, and motion on a smooth sphere, cone, and any surface.	PSO2
CO 3	Understand the degree of freedom, D'Alembert's Principle, compound pendulum, and conservation of momentum and energy.	PSO1

SEMESTER – V	
Name of the Course: **Linear Algebra**	
Course Code: **BMG5DSE1A3**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG5DSE1A3)

The prime objectives of the course are:

- To determine the eigen values and eigen vectors.
- To understand the concept of Algebra of linear transformations and matrices.
- Emphasize the application of techniques using the adjoint of linear operator and their properties to least squares approximation and minimal solutions to systems of linear equations.
- Understand the unique factorization domain and its applications, Cayley Hamilton theorem and its consequences, orthogonal projections and spectral theorem.

Course Outcomes (BMG5DSE1A3)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Use the definition and properties of linear transformations and matrices of linear transformations and change of basis, including kernel, range and isomorphism.	PSO3
CO 2	Demonstrate the ability to graphically or analytically analyze prime and maximal ideals, homomorphism and isomorphism theorem on rings and vector spaces.	PSO4, PSO5
CO 3	Demonstrate knowledge of inner product space, least squares approximation, normal and self-adjoint operator, spectral theorem.	PSO1, PSO2
CO 4	Demonstrate the ability of unique factorization domain and its applications, Cayley Hamilton theorem and its consequences, orthogonal projections and spectral theorem.	PSO5

Choices for DSE1B (Choose any one)

SEMESTER – VI	
Name of the Course: **Numerical Methods**	
Course Code: **BMG6DSE1B1**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (UMTMGE04)

The prime objectives of the course are:

- To comprehend various computational techniques to find approximate value for possible root(s) of non-algebraic equations, to find the approximate solutions of system of linear equations and ordinary differential equations.
- Emphasise the use of Computer Algebra System by which the numerical problems can be solved both numerically and analytically, and to enhance the problem-solving skills.

Course Outcomes (UMTMGE04)

After completing the course, students will be able to

CO. No.	Course Outcome	PSOs Addressed
CO 1	Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.	PSO1
CO 2	Analyse and evaluate the accuracy of common numerical methods.	PSO2

SEMESTER – VI	
Name of the Course: **Complex Analysis**	
Course Code: **BMG6DSE1B2**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG6DSE1B2)

The prime objectives of the course are:

- To introduce the basic ideas of analysis for complex functions in complex variables with visualization through relevant practical.
- Understand Cauchy's theorems, series expansions, and calculation of residues.

Course Outcomes (BMG6DSE1B2)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Conceive the concepts of analytic functions and will be familiar with the elementary complex functions and their properties, and apply the concept and consequences of analyticity and the Cauchy Riemann equations and of results on harmonic and entire functions including the fundamental theorem of algebra.	PSO1, PSO3
CO 2	Applies the theory to the application of the power series expansion of analytic functions, and understand the basic methods of complex integration and its application in contour integration.	PSO2
CO 3	Represent functions such as Taylor, power, and Laurent series, classify singularities and poles, find residues, and evaluate complex integrals using the residue theorem.	PSO4, PSO5

SEMESTER – VI	
Name of the Course: **Linear Programming**	
Course Code: **BMG6DSE1B3**	
Full Marks: 75	Credit: 6
Number of classes required: 60	

Course Objectives (BMG6DSE1B3)

The prime objectives of the course are:

- To develop the ideas underlying the Simplex Method for Linear Programming Problem, as an important branch of Operations Research.
- Understand the Linear programming problems with applications to transportation, assignment and game problem.
- Understand the application of linear programming problems in manufacturing resource planning and financial sectors.

Course Outcomes (BMG6DSE1B3)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed

CO 1	Formulate optimization problems and solve them using different methods.	PSO3
CO 2	Place a Primal linear programming problem into standard form and use the Simplex Method or Revised Simplex Method to solve it and find the dual, and identify and interpret the solution of the Dual Problem from the final tableau of the Primal problem.	PSO1, PSO2
CO 3	Explains the Transportation Problem and Assignment Problem, formulate them as an LPP and hence solve the problem.	PSO4
CO 4	To understand the theory of games for solving simple games.	PSO1, PSO2

Skill Enhancement Courses (SEC)

Choices for SEC 1 (Choose any one)

SEMESTER – III	
Name of the Course: **Logic and Sets**	
Course Code: **BMG3SEC11**	
Full Marks: 50	Credit: 2
Number of classes required: 40	

Course Objectives (BMG3SEC11)

The prime objectives of the course are:

- To properly use the vocabulary and symbolic notation of higher mathematics in definitions, theorems, and problems.
- To analyze the logical structure of statements symbolically, including the proper use of logical connectives, predicates, and quantifiers.
- Construct truth tables, prove or disprove a hypothesis, and evaluate the truth of a statement using the principles of logic.
- Solve problems and write proofs using the concepts of set theory, including the methods of Venn diagrams and truth tables.
- Solve problems and write proofs using the basic definitions and the fundamental properties of subsets and operations on the real numbers, integers, rational and irrational, even and odd, multiples or factors of whole numbers.

Course Outcomes (BMG3SEC11)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	To discuss connectives and well-formed formulas	PSO1, PSO2
CO 2	Learn to evaluate normal forms and illustrate theory of inference for statement calculus	PSO3
CO 3	To define different types of sets and operations on sets	PSO1
CO 4	To explain representation of Venn diagrams	PSO1, PSO3

| CO5 | To describe Cartesian products of sets explain partial ordered relations and posets | PSO4 |
| CO6 | To explain representation and associated terminology of relations | PSO4, PSO5 |

SEMESTER – III	
Name of the Course: **Analytical Geometry**	
Course Code: **BMG3SEC12**	
Full Marks: 50	Credit: 2
Number of classes required: 40	

Course Objectives (BMG3SEC12)

The prime objectives of the course are:

- To get basic knowledge about Circle, Cone, Parabola, Hyperbola, Ellipse etc.
- To understand the concepts & advance topics related to two & three dimensional geometry.
- To study the applications of conics.
- To study the application of Sphere, cone and cylinder.
- To study how to trace the curve.

Course Outcomes (BMG3SEC12)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Understand geometrical terminology for angles, triangles, quadrilaterals and circles.	PSO1, PSO2
CO 2	Measure angles using a protractor.	PSO3
CO 3	Use geometrical results to determine unknown angles.	PSO4
CO 4	Recognise line and rotational symmetries.	PSO1, PSO5
CO 5	Find the areas of triangles, quadrilaterals and circles and shapes based on these.	PSO5

SEMESTER – III	
Name of the Course: **Integral Calculus**	
Course Code: **BMG3SEC13**	
Full Marks: 60	Credit: 2
Number of classes required: 40	

Course Objectives (BMG3SEC13)

The prime objectives of the course are:

- Compute limits, derivatives, and integrals.
- Analyze functions using limits, derivatives, and integrals.
- Recognize the appropriate tools of calculus to solve applied problems.

Course Outcomes (BMG3SEC13)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Use basic integration techniques to calculate area	PSO1
CO 2	Apply integrals to geometric application, physical application, and modeling problems	PSO2
CO 3	Perform additional integration calculations and approximations	PSO3
CO 4	Develop methods to solve differential equations	PSO3
CO 5	Understand infinite series and how to use them to evaluate functions	PSO4
CO 6	Represent functions using power series	PSO4
CO 7	Describing curves through parametric equations and polar coordinates	PSO5

Choices for SEC 2 (Choose any one)

SEMESTER – IV	
Name of the Course: **Vector Calculus**	
Course Code: **BMG4SEC21**	
Full Marks: 50	Credit: 2
Number of classes required: 40	

Course Objectives (BMG4SEC21)

The prime objectives of the course are:

- To gain skills in linear transformation.
- To develop the ability to compute eigenvalues and eigenvectors of linear transformations.
- To find inner product spaces and determine orthogonality.

Course Outcomes (BMG4SEC21)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Solve first order differential equations arising in various engineering fields.	PSO2, PSO3
CO 2	Solve linear differential equations of higher order and use the knowledge to study certain problems in engineering.	PSO4, PSO5

SEMESTER – IV	
Name of the Course: **Theory of Equations**	
Course Code: **BMG4SEC22**	
Full Marks: 50	Credit: 2
Number of classes required: 40	

Course Objectives (BMG4SEC22)

The prime objectives of the course are:

- To describe the graphical representation of a polynomial, maximum and minimum values of a polynomial,
- To acquire the concept of symmetric functions,
- To know the use of Newton's theorem to find the sums of power of roots, homogeneous products, limits of the roots of equation,
- Understand Sturm's theorem and its application.

Course Outcomes (BMG4SEC22)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Describe the relation between roots and coefficients	PSO1, PSO3
CO 2	Find the sum of the power of the roots of an equation using Newton's Method.	PSO3, PSO 5
CO 3	Transform the equation through roots multiplied by a given number, increase the roots, decrease the roots, removal of terms	PSO3, PSO4
CO 4	Solve the reciprocal equations and analyse the location and describe the nature of the roots of an equation.	PSO4, PSO5
CO 5	Obtain integral roots of an equation by using Newton's Method.	PSO 2
CO 6	Compute a real root of an equation by Horner's method.	PSO 3

SEMESTER – IV	
Name of the Course: **Number Theory**	
Course Code: **BMG4SEC23**	
Full Marks: 60	Credit: 2
Number of classes required: 40	

Course Objectives (BMG4SEC23)

The prime objectives of the course are:

- Learn to find quotients and remainders from integer division.
- Apply Euclid's algorithm and backwards substitution.

- Understand the definitions of congruences, residue classes and least residues.

Course Outcomes (BMG4SEC23)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Apply mathematical induction and other types of techniques to prove theorems or mathematical results.	PSO1
CO 2	Apply the concepts and results of divisibility of integers effectively.	PSO2
CO 3	Understand research problems related to number theory.	PSO4
CO 4	Learn various theorems on primes, congruence and residues which are used in cryptography.	PSO3
CO5	Solve problems related to Chinese remainder theorem, Fermat's Little theorem.	PSO2

Choices for SEC 3 (Choose any one)

SEMESTER – V	
Name of the Course: **Probability and Statistics**	
Course Code: **BMG5SEC31**	
Full Marks: 50	Credit: 2
Number of classes required: 40	

Course Objectives (BMG5SEC31)

The prime objectives of the course are:

- To make the students familiar with the basic statistical concepts and tools which are needed to study situations involving uncertainty or randomness.
- To render the students to several examples and exercises that blend their everyday experiences with their scientific interests.
- To extend and formalize knowledge of the theory of probability and use of Baye's theorem.
- To inculcate the concepts of random variables, mathematical expectation and correlation.
- Fostering the concept of discrete and continuous probability distributions.

Course Outcomes (BMG5SEC31)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Compute probabilities and conditional probabilities in appropriate ways.	PSO1, PSO3
CO 2	Solve word problems using combinatorial analysis.	PSO2

| CO 3 | Represent and statistically analyse data both graphically and numerically. | PSO4 |
| CO 4 | Demonstrate the ability of conditional probabilities statistically analyse data both graphically and numerically by presentation. | PSO5 |

SEMESTER – V	
Name of the Course: **Mathematical Finance**	
Course Code: **BMG5SEC32**	
Full Marks: 50	Credit: 2
Number of classes required: 40	

Course Objectives (BMG5SEC32)

The prime objectives of the course are:

- To provide an in-depth approach to credit risk modelling for the specific purpose of pricing fixed income securities and credit-risk derivatives.
- To explore the nature of factors underlying credit risk and develop models incorporating default risk.

Course Outcomes (BMG5SEC32)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Understand the mathematical foundations of quantitative finance	PSO1, PSO2
CO 2	Understand the standard and advanced quantitative methodologies and techniques of importance to a range of careers in investment banks and other financial institutions.	PSO2
CO 3	Create and evaluate potential models for the price of shares.	PSO3, PSO5
CO 4	Construct, evaluate and analyze models for investments and securities.	PSO3
CO 5	Apply scientific models and tools effectively.	PSO4

SEMESTER – V	
Name of the Course: **Mathematical Modeling**	
Course Code: **BMG5SEC33**	
Full Marks: 60	Credit: 2
Number of classes required: 40	

Course Objectives (BMG5SEC33)

The prime objectives of the course are:

- To introduce students to the elements of the mathematical modeling process;
- To present application-driven mathematics motivated by problems from within and outside mathematics;
- To exemplify the value of mathematics in problem solving; and
- To demonstrate connections among different mathematical topics.

Course Outcomes (BMG5SEC33)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Translate everyday situations into mathematical statements (models) which can be solved/analyzed, validated, and interpreted in context.	PSO1, PSO2
CO 2	Identify assumptions that are consistent with the context of the problem and which in turn shape and define the mathematical characterization of the problem.	PSO1
CO 3	Revise and improve mathematical models so that they will better correspond to empirical information and/or will support more realistic assumptions.	PSO2, PSO3
CO4	Assess the validity and accuracy of their approach relative to what the problem requires.	PSO4
CO5	Communicate mathematics in both oral and written form to a broad mathematical and lay audience, including the "end users" of a modeling problem, who may be utterly unfamiliar with the mathematics used.	PSO4, PSO5

Choices for SEC 4 (Choose any one)

SEMESTER – VI	
Name of the Course: **Boolean Algebra**	
Course Code: **BMG6SEC41**	
Full Marks: 50	Credit: 2
Number of classes required: 40	

Course Objectives (BMG6SEC41)

The prime objectives of the course are:

- To discuss connectives and well-formed formulas
- To explain Boolean functions and free Boolean algebras
- To explain representation and minimization of Boolean functions

Course Outcomes (BMG6SEC41)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Define Boolean algebra and sub-algebra	PSO1

| CO 2 | Explain Boolean functions and free Boolean algebras | PSO3 |
| CO 3 | Explain representation and minimization of Boolean functions | PSO4, PSO5 |

SEMESTER – VI
Name of the Course: **Transportation and Game Theory**
Course Code: **BMG6SEC42**
Full Marks: 50	Credit: 2
Number of classes required: 40

Course Objectives (BMG6SEC42)

The prime objectives of the course are:

- To understand the Linear programming problems with applications to transportation, assignment, and game problems.
- To understand the application of linear programming problems in manufacturing resource planning and financial sectors.
- To determine optimality conditions by using the Simplex method.
- To explain the traveling salesman problem and the game theory.
- To explain mixed strategies using linear programming techniques and algebraic methods.

Course Outcomes (BMG6SEC42)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Explain the Transportation Problem and Assignment Problem, formulate them as an LPP, and hence solve the problem.	PSO1, PSO2
CO 2	Understand the theory of games for solving simple games.	PSO2
CO 3	Determine optimality conditions by using the Simplex method. explain the traveling salesman problem	PSO3, PSO5
CO 4	Explain mixed strategies using linear programming techniques and algebraic methods	PSO4

SEMESTER – VI
Name of the Course: **Graph Theory**
Course Code: **BMG6SEC43**
Full Marks: 60	Credit: 2
Number of classes required: 40

Course Objectives (BMG6SEC43)

The prime objectives of the course are:

- Students will achieve command of the fundamental definitions and concepts of graph theory.
- Students will understand and apply the core theorems and algorithms, generating examples as needed, and asking the next natural question.
- Students will achieve proficiency in writing proofs, including those using basic graph theory proof techniques such as bijections, minimal counterexamples, and loaded induction.
- Students will work on clearly expressing mathematical arguments, in discussions and in their writing.
- Students will become familiar with the major viewpoints and goals of graph theory: classification, extremality, optimization and sharpness, algorithms, and duality.

Course Outcomes (BMG6SEC43)

After completing the course, students will be able to:

CO. No.	Course Outcome	PSOs Addressed
CO 1	Understand the concept of Graphs, which is an important tool for Mathematical Modelling	PSO1
CO 2	Understand different types of graphs and operations on graphs.	PSO2
CO 3	Relate real life problems or events with mathematical graphs.	PSO6
CO 4	Understand the concept of trees and algorithms to find special spanning trees.	PSO3
CO5	Understand directed graphs and its applications.	PSO2