Lesson Plan for Course: B.Sc(G) Sem-II **(**DSC**) Code:** MTMGCOR02T **Credit: 6**

- Course Name: Differential Equations
- Course coordinator: Biswajit Sarkar
- Course Outcomes:
  - CO-1. To solve first order first degree ODEs including exact and non-exact equations and higher-order ODEs including properties of Wronskian.
  - CO-2. To solve linear homogenous and non-homogeneous ODEs including Cauchy-Euler equation.
  - CO-3. To solve simultaneous and total differential equations.
  - CO-4. Able to form first order partial differential equations, to solve PDE by Lagrange's method and Charpit's method.
  - CO-5. To classify second order partial differential equations.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Apr	First order exact differential equations.	SM	02	Theoretical-01 Tutorial-01
	Linear homogenous equations with constant coefficients.	BS	03	Theoretical-02 Tutorial-01
	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations.	PD	03	Theoretical-02 Tutorial-01
May	Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	SM	07	Theoretical-05 Tutorial-02
	Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation.	BS	06	Theoretical-04 Tutorial-02
	Formation of first order partial differential equations, Linear partial differential equation of first order.	PD	05	Theoretical-03 Tutorial-02
	1st Internal Assessment			
Jun	Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order.	SM	06	Theoretical-04 Tutorial-02
	Simultaneous differential equations, Total differential equations.	BS	07	Theoretical-05 Tutorial-02
	Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	06	Theoretical-04 Tutorial-02
	2nd Internal Assessment			
	Revision	SM BS PD	02 02 02	Theoretical-06 Tutorial-00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 51 Hrs**	**Theoretical-36 Tutorial-15**

Books:

- Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
- Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition,1967.
- B. Pal, S. Raychowdhury, S. Jana, Differential Equation, Semester-II, Santra Publication Pvt. Ltd., Kolkata-700073.

Lesson Plan for Course: B.Sc(G) Sem-II (GE) **Code:** MTMHGEC02T **Credit: 6**

- Course Name: Differential Equations
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:
  - CO-1. To solve first order first degree ODEs including exact and non-exact equations and higher-order ODEs including properties of Wronskian.
  - CO-2. To solve linear homogenous and non-homogeneous ODEs including Cauchy-Euler equation.
  - CO-3. To solve simultaneous and total differential equations.
  - CO-4. Able to form first order partial differential equations, to solve PDE by Lagrange's method and Charpit's method.
  - CO-5. To classify second order partial differential equations.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Apr	First order exact differential equations.	SM	02	Theoretical-01 Tutorial-01
	Linear homogenous equations with constant coefficients.	BS	03	Theoretical-02 Tutorial-01
	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations.	PD	03	Theoretical-02 Tutorial-01
May	Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	SM	07	Theoretical-05 Tutorial-02
	Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation.	BS	06	Theoretical-04 Tutorial-02
	Formation of first order partial differential equations, Linear partial differential equation of first order.	PD	05	Theoretical-03 Tutorial-02
	1st Internal Assessment			
Jun	Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order.	SM	06	Theoretical-04 Tutorial-02
	Simultaneous differential equations, Total differential equations.	BS	07	Theoretical-05 Tutorial-02
	Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	06	Theoretical-04 Tutorial-02
	2nd Internal Assessment			
	Revision	SM BS PD	02 02 02	Theoretical-06 Tutorial-00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 51 Hrs**	**Theoretical-36** **Tutorial-15**

Books:

- Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
- Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition,1967.
- B. Pal, S. Raychowdhury, S. Jana, Differential Equation, Semester-II, Santra Publication Pvt. Ltd., Kolkata-700073.

For CBCS courses

Lesson Plan for Course: B.Sc(G) Sem-IV (DSC) **Code:** MTMGCOR04T **Credit: 6**

- Course Name: Algebra
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:
  - CO-1. To understand equivalence relations and partitions of a set.
  - CO-2. To know about group, general linear group, permutation group, cyclic, general linear group and quaternion group.
  - CO-3. To understand subgroup, cyclic subgroups, normal subgroup, quotient group, Lagrange's theorem and its application.
  - CO-4. To define and understand rings and subrings.
  - CO-5. To conceptualize with ideals, integral domains and fields.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Apr	Definition and examples of groups, examples of abelian and nonabelian groups, the group Zn of integers under addition modulo n and the group Un of unit under multiplication modulo n.	BS	03	Theoretical-01 Tutorial-02
	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Subgroups.	SM	05	Theoretical-04 Tutorial-01
May	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn(n,R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym(n), Group of quaternions.	BS	05	Theoretical-03 Tutorial-02
	Cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group.	SM	10	Theoretical-08 Tutorial-02
	1st Internal Assessment			
Jun	Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.	BS	07	Theoretical-05 Tutorial-02
	Definition and examples of rings, examples of commutative & non-commutative rings: rings from number systems, Z_n the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, rings of continuous functions.Subrings & ideals, Integral domains and fields, example of field: Z_p, Q, R, & C. Field of rational fns.	SM	12	Theoretical-10 Tutorial-02
	2nd Internal Assessment			
	Revision	BS SM	02 02	Theoretical-04 Tutorial-00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 46 Hrs**	**Theoretical-35 Tutorial-11**

Books:

- John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
- S. K. Mapa, Higher Algebra, Asoke Prakasan, Kolkata-700007

For CBCS courses

Lesson Plan for Course: B.Sc(G) Sem-IV (GE) **Code:** MTMHGEC04T **Credit: 6**

- Course Name: Algebra
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:
  - CO-1. To understand equivalence relations and partitions of a set.
  - CO-2. To know about group, general linear group, permutation group, cyclic, general linear group and quaternion group.
  - CO-3. To understand subgroup, cyclic subgroups, normal subgroup, quotient group, Lagrange's theorem and its application.
  - CO-4. To define and understand rings and subrings.
  - CO-5. To conceptualize with ideals, integral domains and fields.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Apr	Definition and examples of groups, examples of abelian and nonabelian groups, the group Zn of integers under addition modulo n and the group Un of unit under multiplication modulo n.	BS	03	Theoretical-01 Tutorial-02
	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Subgroups.	SM	05	Theoretical-04 Tutorial-01
May	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn(n,R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym(n), Group of quaternions.	BS	05	Theoretical-03 Tutorial-02
	Cyclic subgroups, the concept of a subgroup generated by a subset & the commutator subgroup of group, examples of subgroups including the center of a group.	SM	10	Theoretical-08 Tutorial-02
	1st Internal Assessment			
Jun	Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.	BS	07	Theoretical-05 Tutorial-02
	Definition and examples of rings, examples of commutative & non-commutative rings: rings from number systems, Z_n the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, & rings of continuous functions.Subrings & ideals, Integral domains and fields, examples of fields: Z_p, Q, R, and C. Field of rational functions.	SM	12	Theoretical-10 Tutorial-02
	2nd Internal Assessment			
	Revision	BS SM	02 02	Theoretical-04 Tutorial-00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 46 Hrs**	**Theoretical-35 Tutorial-11**

Books:

- John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
- S. K. Mapa, Higher Algebra, Asoke Prakasan, Kolkata-700007

For CBCS courses

Lesson Plan for Course: B.Sc(G) Sem-IV **(**DSC **&** GE**) Code:** MTMSSEC02M **Credit: 6**

- Course Name: Logic and Sets
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:

CO-1. To learn propositions and precedence of logical operators.

CO-2. Able to apply propositional equivalence,

CO-3. To apply predicates and quantifiers.

CO-4. To aware with sets and subsets.

CO-5. Able to understand standard operations on sets.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Apr	**Unit 1:** Introduction, propositions, truth table, negation, conjunction and disjunction.	BS	02	Theoretical-01 Tutorial-01
	Unit 2: Sets, subsets, Set operations.	SM	03	Theoretical-02 Tutorial-01
May	**Unit 1:** Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.	BS	03	Theoretical-02 Tutorial-01
	Unit 2: The laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle.	SM	05	Theoretical-04 Tutorial-01
Jun	**Unit 1:** Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	BS	04	Theoretical-02 Tutorial-02
	Unit 2: Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.	SM	06	Theoretical-05 Tutorial-01
	Revision	BS SM	02 02	Theoretical-04 Tutorial-00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 27 Hrs**	**Theoretical-20 Tutorial-07**

Books:

- R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
- P.R. Halmos, Naive Set Theory, Springer, 1974.
- E. Kamke, Theory of Sets, Dover Publishers, 1950.

Lesson Plan for Course: B.Sc(G) Sem-VI **Code:** MTMGDSE03T **Credit: 6**

- Course Name: Numerical Methods
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:

CO-1. To understand the algorithm and convergence of numerical methods to solve algebraic equations through bisection, Newton, regular falsi, fixed point iteration methods.
CO-2. Able to find matrix inverse by LU decomposition, Gauss-Jacobi and Gauss-Siedel methods.
CO-3. To determine the function value throuh Lagrange and Newton interpolation foumulae.
CO-4. Capable to apply Euler's method for solving ordinary differential equations.
CO-5. Able to calculate Integration by trapezoidal rule and, Simpson's rule.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Apr	Algorithms, Convergence.	BS	02	Theoretical-01 Tutorial-01
	LU decomposition.	SM	03	Theoretical-03 Tutorial-00
May	Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method.	BS	08	Theoretical-05 Tutorial-03
	Gauss-Jacobi, Gauss-Siedel and SOR iterative methods.	SM	09	Theoretical-07 Tutorial-02
	1st Internal Assessment			
Jun	Integration: trapezoidal rule, Simpson's rule. Euler's method for solving ordinary differential equations.	BS	07	Theoretical-04 Tutorial-03
	Lagrange and Newton interpolation: linear and higher order, finite difference operators. Numerical differentiation: forward difference, backward difference and central Difference.	SM	12	Theoretical-10 Tutorial-02
	2nd Internal Assessment			
	Revision	BS SM	02 02	Theoretical-04 Tutorial-00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 45 Hrs**	**Theoretical-34** **Tutorial-11**

Books:

- S. A. Mollah, An Introduction to Numerical Analysis, Central Publication Pvt. Ltd., Kolkata-700073.

Lesson Plan for Course: B.Sc(G) Sem-VI **Code:** MTMSSEC02M **Credit: 6**

- Course Name: Logic and Sets
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:

CO-1. To learn several operations on sets, like difference, identities, etc.
CO-2. To understand relation on sets including its types.
CO-3. To learn partitions, equivalence relations including congruence modulo relation.
CO-4. To know partial ordering relations.
CO-5. To aware about n-ary relations on sets.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Apr	**Unit 3:** Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections.	SM	05	Theoretical-03 Tutorial-02
May	**Unit 3:** Relation: Product set. Composition of relations, Types of relations.	SM	06	Theoretical-04 Tutorial-02
Jun	**Unit 3:** Partitions, Equivalence Relations with example of congruence modulo relation. Partial ordering relations, n-ary relations.	SM	06	Theoretical-04 Tutorial-02
	Revision	SM	04	Theoretical-04 Tutorial-00
	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 21 Hrs**	**Theoretical-15 Tutorial-06**

Books:

- R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
- P.R. Halmos, Naive Set Theory, Springer, 1974.
- E. Kamke, Theory of Sets, Dover Publishers, 1950.