Lesson Plan for Course: B.Sc (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*
January	First order exact differential equations. Integrating factors, rules to find an integrating factor.	BS	10	Theoretical – 09 Tutorial - 01
	Linear homogenous equations with constant coefficients.	SM	05	Theoretical – 04 Tutorial - 01
	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations.	PD	06	Theoretical – 05 Tutorial - 01
February	First order higher degree equations solvable for x, y, p.	BS	08	Theoretical – 07 Tutorial - 01
	Linear non-homogenous equations	SM	05	Theoretical – 04 Tutorial - 01
	Formation of first order partial differential equations.	PD	04	Theoretical – 03 Tutorial - 01
	1st Internal Assessment			
March	Methods for solving higher-order differential equations.	BS	08	Theoretical – 07 Tutorial - 01
	The method of variation of parameters.	SM	05	Theoretical – 04 Tutorial - 01
	Linear partial differential equation of first order by Lagrange's method	PD	05	Theoretical – 04 Tutorial - 01
April	Basic theory of linear differential equations, Wronskian, and its properties.	BS	12	Theoretical – 11 Tutorial - 01
	The Cauchy-Euler equation, Simultaneous differential equations.	SM	06	Theoretical – 05 Tutorial - 01
	Linear partial differential equation of first order by Charpit's method.	PD	06	Theoretical – 05 Tutorial - 01
	2nd Internal Assessment			
May	Solving a differential equation by reducing its order.	BS	05	Theoretical – 04 Tutorial - 01
	Total differential equations.	SM	02	Theoretical – 01 Tutorial - 01
	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	03	Theoretical – 02 Tutorial - 01

June	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 90 Hrs**	**Theoretical – 75 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(Sem-II) (GE) **Code:** MTMHGEC02T **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*
January	First order exact differential equations. Integrating factors, rules to find an integrating factor.	BS	10	Theoretical – 09 Tutorial - 01
	Linear homogenous equations with constant coefficients.	SM	05	Theoretical – 04 Tutorial - 01
	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations.	PD	06	Theoretical – 05 Tutorial - 01
February	First order higher degree equations solvable for x, y, p.	BS	08	Theoretical – 07 Tutorial - 01
	Linear non-homogenous equations	SM	05	Theoretical – 04 Tutorial - 01
	Formation of first order partial differential equations.	PD	04	Theoretical – 03 Tutorial - 01
	1st Internal Assessment			
March	Methods for solving higher-order differential equations.	BS	08	Theoretical – 07 Tutorial - 01
	The method of variation of parameters.	SM	05	Theoretical – 04 Tutorial - 01
	Linear partial differential equation of first order by Lagrange's method	PD	05	Theoretical – 04 Tutorial - 01
April	Basic theory of linear differential equations, Wronskian, and its properties.	BS	12	Theoretical – 11 Tutorial - 01
	The Cauchy-Euler equation, Simultaneous differential equations.	SM	06	Theoretical – 05 Tutorial - 01
	Linear partial differential equation of first order by Charpit's method.	PD	06	Theoretical – 05 Tutorial - 01
	2nd Internal Assessment			
May	Solving a differential equation by reducing its order.	BS	05	Theoretical – 04 Tutorial - 01
	Total differential equations.	SM	02	Theoretical – 01 Tutorial - 01
	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	PD	03	Theoretical – 02 Tutorial - 01
June	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 90 Hrs**	**Theoretical – 75 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(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*
January	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set.	BS	10	Theoretical – 08 Tutorial - 02
	Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n.	SM	10	Theoretical – 08 Tutorial - 02
Februar y	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(n,R)$.	BS	09	Theoretical – 08 Tutorial - 01
	Subgroups, 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	09	Theoretical – 08 Tutorial - 01
	1st Internal Assessment			
March	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	10	Theoretical – 08 Tutorial - 02
	Cosets, Index of subgroup, Lagrange's theorem, order of an element.	SM	10	Theoretical – 09 Tutorial - 01
April	Normal subgroups: their definition, examples, and characterizations.	BS	11	Theoretical – 09 Tutorial - 02
	Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions, Subrings and ideals.	SM	11	Theoretical – 09 Tutorial - 02
	2nd Internal Assessment			
May	Quotient groups.	BS	05	Theoretical – 04 Tutorial - 01
	Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions.	SM	05	Theoretical – 04 Tutorial - 01
June	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 90 Hrs**	**Theoretical – 75 Tutorial - 15**

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(Sem-IV) (DSC) **Code:** MTMSSEC02M **Credit: 6**

- Course Name: Logic and Sets
- Course coordinator: Dr. Pintu Debnath
- 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*
Jan	**Unit 1:** Introduction, propositions, truth table, negation, conjunction and disjunction.	SM	07	Theoretical – 06 Tutorial- 01
February	**Unit 1:** Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences.	SM	06	Theoretical – 05 Tutorial- 01
March	**Unit 1:** Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	SM	06	Theoretical – 05 Tutorial- 01
April	**Unit 2:** Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets.	SM	08	Theoretical – 07 Tutorial- 01
May	**Unit 2:** Finite sets and counting principle.	SM	03	Theoretical – 02 Tutorial- 01
	End Semester Examination (By Department)			
	Assessment: Internal Assessment		**Total: 30 Hrs**	**Theoretical – 25** **Tutorial - 05**

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(Sem-IV) (GE) **Code:** MTMHGEC04T **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*
January	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set.	BS	10	Theoretical – 08 Tutorial - 02
	Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n.	SM	10	Theoretical – 08 Tutorial - 02
February	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(n,R)$.	BS	09	Theoretical – 08 Tutorial - 01
	Subgroups, 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	09	Theoretical – 08 Tutorial - 01
	1^{st} Internal Assessment			
March	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	10	Theoretical – 08 Tutorial - 02
	Cosets, Index of subgroup, Lagrange's theorem, order of an element.	SM	10	Theoretical – 09 Tutorial - 01
April	Normal subgroups: their definition, examples, and characterizations.	BS	11	Theoretical – 09 Tutorial - 02
	Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions, Subrings and ideals.	SM	11	Theoretical – 09 Tutorial - 02
	2^{nd} Internal Assessment			
May	Quotient groups.	BS	05	Theoretical – 04 Tutorial - 01
	Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions.	SM	05	Theoretical – 04 Tutorial - 01
June	End Semester Examination			
	Assessment: Internal Assessment & Assignment		**Total: 90 Hrs**	**Theoretical – 75** **Tutorial - 15**

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(Sem-IV) (GE) **Code:** MTMSSEC02M **Credit: 6**

- Course Name: Logic and Sets
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:

CO-1. To understand arrays and multi-dimensional arrays.
CO-2. Able to use arrays and multi-dimensional arrays in C-programming.
CO-3. To understand about functions.
CO-4. Capable to write programming by using functions.
CO-5. Able to write programming C languages like n!, nCr, etc.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Jan	**Unit 1:** Introduction, propositions, truth table, negation, conjunction and disjunction.	SM	07	Theoretical – 06 Tutorial- 01
February	**Unit 1:** Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences.	SM	06	Theoretical – 05 Tutorial- 01
March	**Unit 1:** Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	SM	06	Theoretical – 05 Tutorial- 01
April	**Unit 2:** Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets.	SM	08	Theoretical – 07 Tutorial- 01
May	**Unit 2:** Finite sets and counting principle.	SM	03	Theoretical – 02 Tutorial- 01
	End Semester Examination (By Department)			
	Assessment: Internal Assessment		**Total: 30 Hrs**	**Theoretical – 25** **Tutorial - 05**

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.