

**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
<b>1<sup>st</sup> Internal Assessment</b>				
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
<b>2<sup>nd</sup> Internal Assessment</b>				
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		
	<b>Assessment:</b> Internal Assessment & Assignment	<b>Total: 90 Hrs</b>	<b>Theoretical – 75 Tutorial - 15</b>

**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.

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  - 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.
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	The method of variation of parameters.	SM	05	Theoretical – 04 Tutorial - 01
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	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
<b>2<sup>nd</sup> Internal Assessment</b>				
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	<b>End Semester Examination</b>			
	<b>Assessment:</b> Internal Assessment & Assignment		<b>Total: 90 Hrs</b>	<b>Theoretical – 75 Tutorial - 15</b>

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- 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 $Z_n$ 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 $GL_n(n, \mathbb{R})$ .	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
<b>1<sup>st</sup> Internal Assessment</b>				
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, $Z_n$ 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
<b>2<sup>nd</sup> Internal Assessment</b>				
May	Quotient groups.	BS	05	Theoretical – 04 Tutorial - 01
	Integral domains and fields, examples of fields: $Z_p$ , $Q$ , $R$ , and $C$ . Field of rational functions.	SM	05	Theoretical – 04 Tutorial - 01
June	<b>End Semester Examination</b>			
	<b>Assessment:</b> Internal Assessment & Assignment		<b>Total: 90 Hrs</b>	<b>Theoretical – 75 Tutorial - 15</b>

**Books:**

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

**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	<b>Unit 1:</b> Introduction, propositions, truth table, negation, conjunction and disjunction.	SM	07	Theoretical – 06 Tutorial- 01
February	<b>Unit 1:</b> 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	<b>Unit 1:</b> Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	SM	06	Theoretical – 05 Tutorial- 01
April	<b>Unit 2:</b> 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	<b>Unit 2:</b> Finite sets and counting principle.	SM	03	Theoretical – 02 Tutorial- 01
<b>End Semester Examination (By Department)</b>				
	<b>Assessment:</b> Internal Assessment		<b>Total: 30 Hrs</b>	<b>Theoretical – 25 Tutorial - 05</b>

**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 $Z_n$ 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
<b>1<sup>st</sup> Internal Assessment</b>				
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, $Z_n$ 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
<b>2<sup>nd</sup> Internal Assessment</b>				
May	Quotient groups.	BS	05	Theoretical – 04 Tutorial - 01
	Integral domains and fields, examples of fields: $Z_p$ , $Q$ , $R$ , and $C$ . Field of rational functions.	SM	05	Theoretical – 04 Tutorial - 01
June	<b>End Semester Examination</b>			
	<b>Assessment: Internal Assessment &amp; Assignment</b>		<b>Total: 90 Hrs</b>	<b>Theoretical – 75 Tutorial - 15</b>

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

**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**

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February	<b>Unit 1:</b> 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	<b>Unit 1:</b> Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	SM	06	Theoretical – 05 Tutorial- 01
April	<b>Unit 2:</b> 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	<b>Unit 2:</b> Finite sets and counting principle.	SM	03	Theoretical – 02 Tutorial- 01
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