

Lesson Plan for Course: B.Sc (H) Sem-I Code: DS-1 Marks: 100 Credit: 5

- Course Name: Algebra
- Course coordinator: Dr. Sudip Mondal
- Course Outcomes:
 - CO-1. To handle the problem having complex number and complex variables.
 - CO-2. To know the nature of roots of an equation and to solve several types of algebraic equations having degree upto 4.
 - CO-3. To understand the theories of inequalities and their applications.
 - CO-4. To familiar with several topics of number theory and their application.
 - CO-5. To use elementary operations on matrices and to conceptualize about eigen value and eigen vector.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Unit-1: General properties of polynomials and polynomial equations, Fundamental theorem of algebra (statement only). Theorems on imaginary, integral and rational roots; Descartes' rule of signs, Upper bounds for the real roots; Sturm's theorem (statement only) and its applications. Relation between roots and coefficients, Newton's method for integral roots.	BS	06	Theoretical-05 Tutorial-01
	Unit-1: De-Moivre's theorem for integer and rational indices and their applications, The n-th roots of unity. Definitions of exponential and trigonometrical functions of a complex variable, exponential values of sine and cosine. Periods of exponential and trigonometrical functions.	SM	07	Theoretical-06 Tutorial-01
	Unit-1: The inequality involving $AM \geq GM \geq HM$, Extreme values of sum and product, theorem of weighted means, Weierstrass' & Cauchy's inequalities, m-th and generalized m-th power theorems. Unit-2: Equivalence relations and partitions, Functions, Invertible functions, One to one correspondence and cardinality of a set.	PD	07	Theoretical-06 Tutorial-01
Sep	Unit-1: Transformation of equation, Equation of squared differences of a cubic and the nature of the roots of a cubic, Cardan's solution of the cubic and the nature of the roots of the cubic. Reciprocal equations.	BS	03	Theoretical-02 Tutorial-01
	Unit-1: Logarithm of a complex number and its properties, Definitions of a^z , Inverse circular functions, hyperbolic functions, along with exercises of all these concepts.	SM	03	Theoretical-02 Tutorial-01
	Unit-2: Permutations, sign of a permutation, inversions, cycles and transpositions.	PD	03	Theoretical-01 Tutorial-02

1 st Internal Assessment				
Oct	Unit-3: Matrix of real and complex numbers, Algebra of matrices (structure only); symmetric and skew symmetric matrices, Hermitian and skew- Hermitian matrices; Orthogonal and Unitary matrices. Determinants, Laplace expansions, cofactors, adjoint, inverse of a matrix, Cramer`s Rule.	BS	05	Theoretical-04 Tutorial-01
	Unit-3: Elementary row and Elementary column operations on matrices; elementary matrices; Echelon form, Triangular factorization of matrices: $A = LU$, $A = LDV$, $PA = LU$, $EA = R$; product of elementary matrices and inverse of a matrix. Rank of a matrix; Determination of rank (relevant results are to be stated only).	SM	06	Theoretical-05 Tutorial-01
	Unit-2: Well-ordering principle of non-negative integers, Principles of Mathematical Induction of positive integers, Division algorithm, Divisibility and Euclidean algorithm., g.c.d, Bezout`s Theorem, Primes, Euclid`s Lemma, Statement of Fundamental Theorem of Arithmetic, Euclid`s proof of infinitely many primes.	PD	06	Theoretical-05 Tutorial-01
Nov	Unit-1: Binomial equations and their properties, special roots of $x^n = 1$.	BS	03	Theoretical-01 Tutorial-02
	Unit-3: System of linear equations in matrix form $AX = B$; Consistency and inconsistency (by rank method); Types and determination of solution (by using notion of rank).	SM	03	Theoretical-02 Tutorial-01
	Unit-2: Congruence relation between integers, Euler ϕ function, Euler`s theorem, Fermat`s Theorem.	PD	03	Theoretical-02 Tutorial-01
Dec	Unit-1: Descartes` and Ferrari`s methods of solution of biquadratic equations.	BS	04	Theoretical-03 Tutorial-01
	Unit-3: Solving linear systems using Gaussian elimination, Gauss-Jordan row reduction, Reduced row echelon form, Equivalent systems.	SM	04	Theoretical-04 Tutorial-00
	Unit-3: Eigenvalues, Eigenvectors of matrices and their examples and properties, Characteristic polynomial of a matrix, Cayley-Hamilton theorem and its application for determining inverse of square matrix.	PD	04	Theoretical-04 Tutorial-00
2 nd Internal Assessment				
	Revision	BS SM PD	03 03 02	Theoretical-08 Tutorial-00
End Semester Examination				
	Assessment: Internal Assessment & Assignment		Total: 75 Hrs	Theoretical-60 Tutorial-15

Books:

- TituAndreescu and DorinAndrica, Complex Numbers from A to Z, Birkhauser, 2006.
- Dickson, Leonard Eugene (2009), First Course in the Theory of Equations. John Wiley & Sons, Inc. The Project Gutenberg eBook:<http://www.gutenberg.org/ebooks/29785> 3
- W.S. Burnstine and A.W. Panton, Theory of equations, Vol. 1. Fourteenth Edition, S. Chand and Co Ltd, New Delhi.
- Burton, David M. (2011), Elementary Number Theory (7th ed.), McGraw-Hill Education Pvt. Ltd. Indian Reprint.
- S. Barnard and J.M. Child, Higher Algebra, Surjeet Pbl., New Delhi, 1990
- David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
- K.B. Dutta, Matrix and Linear algebra.
- K. Hoffman, R. Kunze, Linear algebra.
- Gilbert Strang, Introduction to Linear Algebra, 4th edition, Welleseley-Camberidge press, 2009.

Lesson Plan for Course: B.Sc (H) Sem-I Code: SE-1 Marks: 50 Credit: 3

- Course Name: C-Programming Language
- Course coordinator: Dr. Pintu Debnath
- Course Outcomes:
 - CO-1. Learn basic of high-level programming languages.
 - CO-2. To know about some arithmetic operators and logical operators to construct flowchart.
 - CO-3. Able to use for loop, while loop and do-while loop in C-programming.
 - CO-4. Able to use arrays and multi-dimensional arrays in C-programming.
 - CO-5. Capable to write programming by using functions.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Unit-1: Basics of Computer Programming: Definition, Requirement of programming language, Machine language, high-level programming languages, machine code of a program: compilation process.	BS	04	Theoretical-03 Tutorial-01
	Unit-1: Basics of Computer Programming: Problem solving approaches: algorithm and flowchart.	SM	06	Theoretical-05 Tutorial-01
Sep	Unit-2: Fundamentals of Programming: Built in Data Types: int, float, double, char; Constants and Variables; first program: printf(), scanf(), compilation etc., keywords.	BS	03	Theoretical-02 Tutorial-01
	Unit-2: Fundamentals of Programming: Arithmetic operators: precedence and associativity, Assignment Statements: post & pre increment/decrement, logical operators: and, or, not.	SM	03	Theoretical-02 Tutorial-01
Oct	Unit-3: Statements: Relational operators, if-else statement, Iterative Statements: for loop, while loop and do-while loop; controlling loop execution: break and continue, nested loop.	BS	04	Theoretical-02 Tutorial-02
	Unit-4: Arrays: Definition & requirement, declaration & initialization, indexing, one dimensional array: finding maximum, minimum, simple sorting and searching.	SM	07	Theoretical-05 Tutorial-02
	Unit-5: Multi-dimensional arrays: Matrix Manipulations (Addition, Multiplication, Transpose). Arrays and Pointers, Memory allocation and deallocation: <i>malloc()</i> and <i>free()</i> functions.			
Nov	Unit-6: Functions: Why?, How to declare, define and invoke a function, Variables' scope, local & global variables and function parameters, Pointers, arrays as function parameters, <i>return</i> statement, Header files and their role.	BS	04	Theoretical-02 Tutorial-02
	Unit-6: Functions: Illustrate different examples like swapping values, compute $n!$, nCr , find max/min from a list of elements, sort a set of numbers, matrix addition/ multiplication	SM	04	Theoretical-02 Tutorial-02

Dce	Programme practicing.	BS	03	Theoretical-03 Tutorial-00
	Programme practicing.	SM	04	Theoretical-04 Tutorial-00
End Semester Examination (By Department)				
	Assessment: Assignment		Total: 42 Hrs	Theoretical-30 Tutorial-12

Books:

- Yashavant Kanetkar, Let Us C , BPB Publications, 2016.
- Kamthane AN. Programming in C, 2/e. Pearson Education India; 2011.
- Satbir Mehla, Vishakha Gupta, M.L. Jain, AmitSehgal, New College Programming in C and Numerical Methods For B.A./B.Sc., Jeevansons Publications, India, Ninth Revised Edition, 2015

Lesson Plan for Course: B.Sc (H) Sem-I Code: MD-1 Marks: 50 Credit: 3

- Course Name: Basic Mathematics
- Course coordinator: Dr. Biswajit Sarkar
- Course Outcomes:
 - CO-1. To conceptualize set, relation and functions.
 - CO-2. To conceptualize probability and statistic and their application to our daily life
 - CO-3. To calculate matrix inversion, value of a determinant and to solve a set of linear equations.
 - CO-4. To conceptualize two dimensional geometry.
 - CO-5. To conceptualize LPP and their application in our daily life.

Course planner

Month	Course Topic	Teacher	Class-hour	Remarks*
Aug	Matrix: Matrix, order of Matrix, Types of Matrix, equality of matrices, Algebra or operations of Matrices, symmetric & skew symmetric matrices, Elementary operations of a matrix, inverse of matrix, Inverse of a matrix by elementary operations (up to 3×3).	BS	04	Theoretical-03 Tutorial-01
	Sets, Relations & Functions: Sets, subsets, set operations, Venn diagram, relations, equivalence relations. Mappings, functions, domain & co-domain, one-to-one and onto functions, inverse function, Logarithmic, exponential functions and their elementary properties, periodic & trigonometric functions.	SM	04	Theoretical-03 Tutorial-01
Sep	Determinants: Determinant, properties of determinants, cofactor, adjoint and inverse of a square matrix (up to order 3), Determination of rank of matrix, solution of system of linear equations using (i) inverse of a matrix, and (ii) Cramer's Rule; conditions of consistency & inconsistency (all up to order 3).	BS	04	Theoretical-02 Tutorial-02
	Probability and Statistics: Events, probability of an event.	SM	02	Theoretical-00 Tutorial-02
Oct	Co-ordinate Geometry (2D): Distance between two points, slope of a line, angle between two lines, conditions for parallelism and perpendicularity of lines, Equations of a straight line in various forms, Distance of a point from a line and distance between two parallel lines.	BS	03	Theoretical-02 Tutorial-01
	Probability and Statistics: Conditional probability, Bayes' theorem & their applications, Discrete random variable and its probability distribution.	SM	04	Theoretical-03 Tutorial-01
Nov	Co-ordinate Geometry (2D): Standard equations of circle and parabola, ellipse and hyperbola. Latus rectum of parabola, ellipse and hyperbola, co-ordinates of their foci, eccentricity of ellipse and hyperbola (problems using formulae only).	BS	03	Theoretical-02 Tutorial-01
	Probability and Statistics: Expectation (mean) & variance of a single random variable.	SM	02	Theoretical-00 Tutorial-02

Dce	Linear Programming Problem (LPP): Graphical solution of a system of Linear inequations in two variables. Linear Programming Problem (LPP) and its mathematical formulations, objective function, linear constraints, Graphical method of solving LPP, feasible region, feasible solution, corner (extreme) point, optimal solution.	BS	05	Theoretical-04 Tutorial-01
	Probability and Statistics: Computation or calculation of mean, median, mode, variance and standard deviation for ungrouped and grouped data.	SM	04	Theoretical-03 Tutorial-01
End Semester Examination (By Department)				
	Assessment: Assignment		Total: 35 Hrs	Theoretical-22 Tutorial-13

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.
- A.M.Gun, M.K. Gupta, B. Dasgupta, An Outline of Statistical Theory, Vol1 & Vol2, TheWorld Press PVT, 2003.
- Robert V. Hogg, Joseph W. McKean and Allen T. Craig, Introduction to Mathematical Statistics, Pearson Education, Asia, 2007.
- N.G. Das, Statistical Methods, combined edition (volumes I & II), Mc Graw Hill Education PVT Ltd, New Delhi, 2015.
- A. Gupta, Ground work of Mathematical Probability and Statistics, Academic publishers, 1983.
- Hamdy A. Taha, Operations Research, An Introduction, 8th Ed., Prentice-Hall India, 2006.
- F.S. Hillier and G.J. Lieberman, Introduction to Operations Research, 9th Ed., Tata McGraw Hill, Singapore, 2009.
- Gilbert Strang, Introduction to Linear Algebra, 4th edition, Welleseley-Camberidge press, 2009.
- K. Hoffman, R. Kunze, Linear algebra.