

B.A./B.Sc. II (SEMESTER-III) PAPER-I Algebra & Mathematical Methods

Programme: Diploma	Year: Second	Semester: Third
Class: B.A./B.Sc.		
Subject: Mathematics		
Course Code: B030301T	Course Title: Algebra & Mathematical Methods	
Course outcomes:		
CO1: Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of Group, Ring theory and their properties.		
CO2: A student learning this course gets a concept of Group, Ring, Integral Domain and their properties. This course will lead the student to basic course in advanced mathematics and Algebra.		
CO3: The course gives emphasis to enhance students' knowledge of functions of two variables, Laplace Transforms, Fourier Series.		
CO4: On successful completion of the course students should have knowledge about higher different mathematical methods and will help him in going for higher studies and research.		
Credits: 6	Core Compulsory / Elective	
Max. Marks: 25+75	Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 6-0-0		
Part- A Algebra		
Unit	Topics	No. of Lectures
I	Cartesian product of Sets, Functions or mappings, Binary operations, Relation, Equivalence relations and partitions, Congruence modulo n , Definition of a group with examples and simple properties, Abelian group, Finite and infinite group, Order of a finite group, General properties of groups, Composition table for finite groups	12
II	An Alternative set of postulates of groups, Subgroups. Permutations, Cyclic Permutations, Even and odd permutations, group of Permutations alternating group, Integral power of an element of a group, Order of an element of a group, Group homomorphism, Isomorphism on groups, the relation of isomorphism in the set of all groups Complexes and subgroup of a group, theorems on subgroups, Coset decomposition, Lagrange's theorem and its consequences, Cayley's theorem, Cyclic group, generating system of group.	11
III	Normal subgroups, Simple group, Conjugate elements, Normalizer of an element of a group, Class equation of a group, Centre of a group, Conjugate subgroups, Invariant subgroups, Quotient group, Homomorphism and Isomorphism on groups, Kernel of a Homomorphism and related theorems.	11
IV	Rings, Elementary properties of Ring, Ring with or without zero divisors, Integral domains and field, Division ring or skew field, Homomorphism and Isomorphism on rings, Subrings, Subfields, Characteristic of a ring, Ideal and quotient rings	11

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Part- B Mathematical Methods		
Unit	Topics	No. of Lectures
V	Limit and Continuity of functions of two variables, Differentiation of function of two variables, Necessary and sufficient condition for differentiability of functions two variables, Schwarz's and Young theorem (Statement Only), Taylor's theorem for functions of two variables with examples, Maxima and minima for functions of two variables, Lagrange multiplier method, Jacobians.	12
VI	Existence theorems for Laplace transforms, Linearity of Laplace transform and their properties, Laplace transform of the derivatives, Initial and final value theorems and Evaluation of Integrals of a function	11
VII	Inverse Laplace transforms, Linearity of Inverse Laplace transform, Shifting theorems (first and second), Convolution theorem. Solution of the differential equations using Laplace transforms.	11
VIII	Fourier series, Fourier expansion of piecewise monotonic functions, Half and full range expansions, Fourier transforms (finite and infinite), Application of Fourier Transform in initial and boundary value problem. Fourier integral. The topic "Indian Ancient Mathematics and Mathematicians should be covered under Continuous Internal Evaluation (CIE). (Appendix)	11
Suggested Readings (Part-A Algebra):		
1. J.B. Fraleigh, A first course in Abstract Algebra , Addison-wiley, 2003		
2. I. N. Herstein, Topics in Algebra , John Wiley & Sons, 2006		
3. Thomas W Hungerford, Abstract Algebra – An Introduction , Saunders College Publishing 1990		
4. Joseph A Gallian, Contemporary Abstract Algebra , Brooks/Cole Cengage Learning, 2016		
5. Suggested digital platform: NPTEL/SWAYAM/MOOCs		
Suggested Readings (Part- B Mathematical Methods):		
1. T.M. Apostol, Mathematical Analysis , Person, 1974		
2. G.F. Simmons, Differential Equations with Applications and Historical Notes , Tata -Mc Graw Hill 2002		
3. Erwin Kreyszig, Advanced Engineering Mathematics , John Wiley & Sons. 2011		
4. Suggested digital platform: NPTEL/SWAYAM/MOOCs		
This course can be opted as an elective by the students of following subjects: Engg. and Tech. (UG), B.Sc. (C.S.)		
Suggested Continuous Evaluation Methods: Max. Marks: 25		
SN	Assessment Type	Max. Marks
1	Class Tests	10
2	Online Quizzes/ Objective Tests	5
3	Presentation	5
4	Assignment (Introduction to Indian ancient Mathematics and Mathematicians)	5
Course prerequisites: To study this course, a student must have subject Mathematics in class 12 th		
Suggested equivalent online courses:		
Further Suggestions:		

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