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

Programme: Diploma Class: B.A./B.Sc.	Year: Second	Semester: Third
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	**Introduction to Indian ancient Mathematics and Mathematicians should be included under Continuous Internal Evaluation (CIE).** Equivalence relations and partitions, Congruence modulo n, Definition of a group with examples and simple properties, Subgroups, Generators of a group, Cyclic groups.	12
II	Permutation groups, Even and odd permutations, The alternating group, Cayley's theorem, Direct products, Coset decomposition, Lagrange's theorem and its consequences, Fermat and Euler theorems	11
III	Normal subgroups, Quotient groups, Homomorphism and isomorphism, Fundamental theorem of homomorphism, Theorems on isomorphism.	11
IV	Rings, Subrings, Integral domains and fields, Characteristic of a ring, Ideal and quotient rings, Ring homomorphism, Field of quotient of an integral domain.	11

<table>
<tr><th colspan="3">Part- B
Mathematical Methods</th></tr>
<tr><th>Unit</th><th>Topics</th><th>No. of Lectures</th></tr>
<tr><td>V</td><td>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, Taylor's theorem for functions of two variables with examples, Maxima and minima for functions of two variables, Lagrange multiplier method, Jacobians.</td><td>12</td></tr>
<tr><td>VI</td><td>Existence theorems for Laplace transforms, Linearity of Laplace transform and their properties, Laplace transform of the derivatives and integrals of a function, Convolution theorem, inverse Laplace transforms, Solution of the differential equations using Laplace transforms.</td><td>11</td></tr>
<tr><td>VII</td><td>Fourier series, Fourier expansion of piecewise monotonic functions, Half and full range expansions, Fourier transforms (finite and infinite), Fourier integral.</td><td>11</td></tr>
<tr><td>VIII</td><td>Calculus of variations-Variational problems with fixed boundaries- Euler's equation for functionals containing first order derivative and one independent variable, Extremals, Functionals dependent on higher order derivatives, Functionals dependent on more than one independent variable, Variational problems in parametric form.</td><td>11</td></tr>
</table>

Suggested Readings(Part-A Algebra):

1. J.B. Fraleigh, A first course in Abstract Algebra, Addison-weley
2. I. N. Herstein, Topics in Algebra, John Wiley & Sons
3. Suggested digital plateform: NPTEL/SWAYAM/MOOCS
4. Course Books published in Hindi may be prescribed by the Universities.

Suggested Readings (Part- B Mathematical Methods):

1. T.M. Apostal, Mathematical Analysis, Person
2. G.F. Simmons, Differential Equations with Application and Historical Notes, Tata -McGrawHill
3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
4. Suggested digital plateform:NPTEL/SWAYAM/MOOCs
5. Course Books published in Hindi may be prescribed by the Universities.

This course can be opted as an elective by the students of following subjects: Engg. and Tech. (UG), B.Sc.(C.S.)

<table>
<tr><th colspan="3">Suggested Continuous Evaluation Methods: Max. Marks: 25</th></tr>
<tr><th>SN</th><th>Assessment Type</th><th>Max. Marks</th></tr>
<tr><td>1</td><td>Class Tests</td><td>10</td></tr>
<tr><td>2</td><td>Online Quizzes/ Objective Tests</td><td>5</td></tr>
<tr><td>3</td><td>Presentation</td><td>5</td></tr>
<tr><td>4</td><td>Assignment (Introduction to Indian ancient Mathematics and Mathematicians)</td><td>5</td></tr>
</table>

Course prerequisites: To study this course, a student must have subject Mathematics in class 12th

Suggested equivalent online courses:

Further Suggestions: