

**H.K.E Society's**  
**A.V. PATIL Arts Science & Commerce College Aland**  
**Teaching plan Odd/Even Semester for the Academic Year - 2021-22**  
**Program: Bachelor of Science**                      **Course: Mathematics**

**Department: Mathematics**

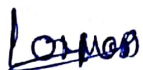
**Name of the Lecturer: Laxman Rathod**

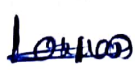
<b>B.Sc 1 Semester</b>				
<b>Matrices, Trigonometry and Differential Calculus</b>				
<b>Unit1: Matrices and properties.</b>				
S.No	Month	Topic to be Covered	Hours	Method
1	November 2021	Matrix introduction, matrix operations with their properties, symmetric, skew-symmetric, Hermitian and skew-Hermitian matrices, idempotent, nilpotent, involutory, orthogonal and unitary matrices, singular and non-singular matrices, elementary operations on matrices, adjoint and inverse of a matrix, singular and non-singular matrices, negative integral powers of a non-singular matrix, Trace of a matrix	8	Lecture method and Unit test
2	November 2021	Rank of a matrix, elementary transformations of a matrix and invariance of rank through elementary transformations, normal form of a matrix, elementary matrices, rank of the sum and product of two matrices, inverse of a non-singular matrix through elementary row transformations, equivalence of matrices.	7	Lecture method
3	November 2021	Solutions of a system of linear equations, condition consistency and nature of the general solution of a system of linear nonhomogeneous equations.	5	Lecture method and Unit test
<b>Unit:2 , Trigonometry and Properties</b>				
4	December 2021	Trigonometric or circular and hyperbolic function of complex variable together with their inverses, De Moivre's Theorem and its applications, Euler's theorem, relation between trigonometric and hyperbolic function, Exponential function of a complex variable, Logarithms of complex variable, Properties of logarithmic function, Separation into real and imaginary parts	6	Lecture method and
5		Gregory's series, Value of $\pi$ by different		Lecture method

	December 2021	Summation of Trigonometric series by C+iS method based on Arithmetic Progression, Geometric Progression, Logarithms and Binomial expansions, Summation of Trigonometric series by difference method.	6	method and Unit test
--	---------------	--	---	----------------------

**Unit 3: Differential Calculus and Properties**

6	December 2021 - Jan-2022	Functions of one variable, Limit of a function ( $\epsilon$ - $\delta$ Definition), Continuity of a function, Properties of continuous functions, Intermediate value theorem, Classification of discontinuities, Differentiability of a function, Jacobians, maxima and minima of single variable function, Rolle's Theorem, Mean value theorems and their geometrical interpretations, Applications of mean value theorems.	7	Lecture method
7	Jan-2022	Successive Differentiation, nth Differential coefficient of functions, Leibnitz Theorem, Taylor's Theorem, Maclaurin's Theorem, Taylor's and Maclaurin's series expansions.	6	Lecture method
8	Jan-22 and Feb-22	Geometrical meaning of tangent, Definition and equation of Tangent, Tangent at origin, Angle of intersection of two curves, Definition and equation of Normal, Cartesian subtangent and subnormal, Tangents and normals of polar curves, Angle between radius vector and tangent, Perpendicular from pole to tangent, Pedal equation of curve, Polar subtangent and polar subnormal, Derivatives of arc (Cartesian and polar formula).	8	Lecture method and Unit test
9	Feb-22 And Mar-22 Revised	Curvature, Radius of curvature, Cartesian, Polar and pedal formula for radius of curvature, Tangential polar form, Centre of curvature, Asymptotes of algebraic curves, Methods of finding asymptotes, Parallel asymptotes, existence and classification of singular points, points of inflection.	7	Lecture method

  
Signature of the Lecturer

  
Signature of the HOD

  
Principal

Head  
Dept. of Mathematics  
H.K.E.S's A.V. Patil Degree College  
Aland

**PRINCIPAL**  
**H. K. E. SOCIETY'S**  
**A.V. Patil Degree College,**  
**ALAND**

**B.Sc III Semester**  
**ALGEBRA-II, REAL ANALYSIS-II AND CALCULUS-III**

**Unit:1**

**Algebra :1**

1	Nov - 2021	<b>Groups:</b> Definition of Groups and Sub-group and properties, Necessary and sufficient condition for a sub-group, Order of an element, Classification of sub-groups (i) Cyclic subgroups, (ii) Co-sets, (iii) normal sub-groups, Standard Theorems (Every cyclic group is abelian, Lagrange's theorem, Euler's theorem, Fermat's theorem, Necessary and sufficient condition for normal sub-group). , Homomorphism, Isomorphism, Kernel of homomorphism with examples	15	Lecture method and Unit test
---	------------	--	----	------------------------------

**Unit:2**

**Real Analysis:2**

2	Nov - Dec - 2021	<b>Riemann Integration</b> Lower and upper Riemann sums, Lower and upper Riemann integrals, Necessary and sufficient conditions for Riemann Integrability, Riemann integrals, Properties of Riemann-integrable functions ((i) Upper R-Integral exceeds the lower R-Integral (ii) R-Integral lies between $m(b-a)$ and $M(b-a)$ ), R-Integrability of (i) continuous function (ii) monotonic function.	15	Lecture method and Unit test
3	Dec - 2021 - Jan - 2022	<b>Fundamentals of Riemann Integral:</b> Fundamental theorem of integral calculus, First and second mean value theorem of integral calculus. Leibnitz's result to evaluate the examples of differentiation under the integral sign.	15	

**Unit:3**

**CALCULUS-III**

4	Jan - 2022 to Feb - 2022	<b>Theory of Plane Curves:</b> Polar coordinates, Angle between the radius vector and the tangent to the curves, length of the perpendicular from the pole to the tangent to the curve, pedal equation of the curves, whose equation is given in polar form with examples. Curvature, Radius of curvature, Centre of curvature, Circle of curvature, Evolute and Involute, Envelopes with related examples.	15	Lecture method and Unit test
---	--------------------------	--	----	------------------------------

*Laxman*  
Signature of the Lecturer

*Laxman*  
Signature of the HOD

*U*  
Principal

Head  
Dept. of Mathematics  
H.K.E.S's A.V. Patil Degree College  
Aland

**PRINCIPAL**  
H. K. E. SOCIETY'S  
A.V. Patil Degree College,  
ALAND



**B.Sc:5 Semester  
Numerical Analysis**

**Unit:1 Solution of Nonlinear Equations**

1	Nov-2021	Definition and Types of errors. Solution of nonlinear equations: method of successive bisection, method of false position, Newton-Raphson's iterative method, Secant method	15	Lecture method and Unit test
---	----------	---	----	------------------------------

**Unit:2 Solution of linear System of equations**


2	Nov-2021 - Dec-21	Solution of system of equations: Gauss Elimination method, Jacobi's method, Gauss-Seidel method.	15	Lecture method and Unit test
---	----------------------	--	----	------------------------------

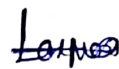
**Unit:3 Finite Differences**


3	Dec-21 - Jan-22	Forward difference, backward difference, Shifting operator, Relation between A, V, E. Difference table and nth differences of a polynomial.	15	Lecture method and Unit test
---	-----------------------	---	----	------------------------------

**Unit:4 Interpolation**

4	Jan-22 - Feb-22	Interpolation with equal intervals: Newton-Gregory forward and backward interpolation formula, Interpolation with unequal intervals: Lagrange's and Newton's divided difference interpolation formula.	15	Lecture method and Unit test Lecture method and Unit test
---	-----------------------	--	----	--

  
Signature of the Lecturer

  
Signature of the HOD  
Head  
Dept. of Mathematics  
H.K.E.S's A.V. Patil Degree College  
Aland

  
Principal  
PRINCIPAL  
H. K. E. SOCIETY'S  
A.V. Patil Degree College,  
ALAND

**H.K.E Society's**  
**A.V. PATIL Arts Science & Commerce College Aland**  
**Teaching plan Odd/Even Semester for the Academic Year - 2021-22**  
**Program: Bachelor of Science**                      **Course: Mathematics**

**Department: Mathematics**

**Name of the Lecturer: Laxman Rathod**

**B.Sc 2nd Semester**  
**Integral calculus and Vector Analysis**

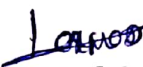
**Unit:1 Integral Calculus**

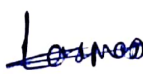
1	March-22	Integral as a limit of sum, Properties of Definite integrals, Fundamental theorem of integral calculus, Summation of series by integration, Infinite integrals, Differentiation and integration under the integral sign	12	Lecture method
2	April-22	Beta function, Properties and various forms, Gamma function, Recurrence formula and other relations, Relation between Beta and Gamma function, Evaluation of integrals using Beta and Gamma functions.	11	Lecture method and Unit test
3	April-22	Double integrals, Repeated integrals, Evaluation of Double integrals, Double integral in polar coordinates, Change of variables, Change of order of integration in Double integrals, Triple integrals, Evaluation of Triple integrals, Dirichlet's theorem and its Liouville's extension	12	Lecture method
4	May-22	Area bounded by curves (quadrature), Rectification (length of curves), Volumes and Surfaces of Solids of revolution.	11	Lecture method and Unit test


**Unit:2**                                      **Vector Analysis**

5	May-22	Triple product, Reciprocal vectors, Product of four vectors, General equation of a Plane, Normal and Intercept forms, Two sides of a plane, Length of perpendicular from a point to a plane, Angle between two planes, System of planes	11	Lecture method
6	Jun-22	Direction Cosines and Direction ratios of a line, Projection on a straight line, Equation of a line, Symmetrical and unsymmetrical forms, Angle between a line and a plane, Coplanar lines, Lines of shortest distance, Length of perpendicular from a point to a line, Intersection of three planes, Transformation of coordinates	12	Lecture method and Unit test

7	Jun-22	Ordinary differentiation of vectors, Velocity and Acceleration, Differential operator-Del, Gradient, Divergence and Curl	11	Lecture method and Unit test
8	July-22	Line, Surface and volume integrals, Simple applications of Gauss divergence theorem, Green's theorem and Stokes theorem (without proof).	10	Lecture method and Unit test

  
Signature of the Lecturer

  
Signature of the HOD  
Head  
Dept. of Mathematics  
H.K.E.S's A.V. Patil Degree College  
Aland

  
Principal  
PRINCIPAL  
H. K. E. SOCIETY'S  
A.V. Patil Degree College,  
ALAND

**B.Sc:4 Semester  
Differential Equations**

**Unit:1 Ordinary Differential Equations**

1	Mar-22 — Apr-22	Differential equations of first order and higher degree: Equations solvable for p, x, y and Clairault's equations-General and singular solutions. Higher order differential equations: Linear Differential Equations with constant coefficients, finding Complementary function and Particular integral (When RHS function is of the form $e^{ax}$ , $x^n$ , $\sin ax$ , $\cos ax$ , $e^{ax}V$ , where V is a function of x).	15	Lecture method and Unit test
---	-----------------------	---	----	------------------------------

**Unit:2 Linear Differential Equations**

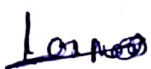
2	Apr-22 — May-22	Linear Differential Equation with variable coefficients: Cauchy-Euler Differential Equations, Legendre-Linear differential equations. Solution of Second order Linear differential equations with variable coefficients by the method of Variation of parameters.	15	Lecture method and Unit test
---	-----------------------	---	----	------------------------------

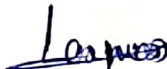
**Unit:3 Total Differential Equations**

3	May-22 — Jun-22	Integrability, Necessary condition for integrability, Conditions for exactness, Solution by inspection method. Simultaneous Differential Equations $dx/P=dy/Q=dz/R$	15	Lecture method and Unit test
---	-----------------------	---	----	------------------------------

**Unit:4 Partial Differential Equations**

4	Jun-22 — July-22	Formation of partial differential equations, Lagrange's equation $Pp+Qq= R$ , First order non- linear partial differential equations and finding their complete integral by reducing to standard forms $fp,q=0, fp,q,z=0, f(x,p)=g(y,q)$ , Clairaut's form, Charpit's method (without proof).	15	Lecture method and Unit test
---	------------------------	---	----	------------------------------

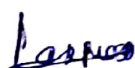
  
Signature of the Lecturer

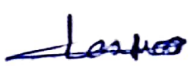
  
Signature of the HOD  
Head  
Dept. of Mathematics


  
Principal  
PRINCIPAL  
H. K. E. SOCIETY'S

H.K.E.S's A.V. Patil Degree College Aland A.V. Patil Degree College, ALAND

B.Sc:6 Semester Numerical Analysis-II				
Unit:1 Numerical Differentiation				
1	Mar-22 - Apr-22	Numerical differentiation using forward and backward difference formula - computation of first and second derivatives	15	Lecture method and Unit test
Unit:2 Numerical integration				
2	Apr-22 - May-22	General Quadrature formula - Trapezoidal rule, Simpsons 1/3 rd and 3/8th rules, Weddles Rule	15	Lecture method and Unit test
Unit:3 Solution of IVP				
3	May-22 - June-22	Solutions of initial value problem for ordinary linear first order differential equations by Picard's, Taylor's, Euler's, Euler's modified method, and Runge - Kutta Methods of order 2 and 4	15	Lecture method and Unit test
Unit:4: Predictor-corrector methods:				
4	June-22 - July-22	Adams-Bashforth Predictor-Corrector method and Milne Predictor-Corrector method. Finite difference method, shooting method	15	Lecture method and Unit test

  
Signature of the Lecturer

  
Signature of the HOD  
Head  
Dept. of Mathematics  
H.K.E.S's A.V. Patil Degree College  
Aland

  
Principal  
PRINCIPAL  
H. K. E. SOCIETY'S  
A.V. Patil Degree College,  
ALAND