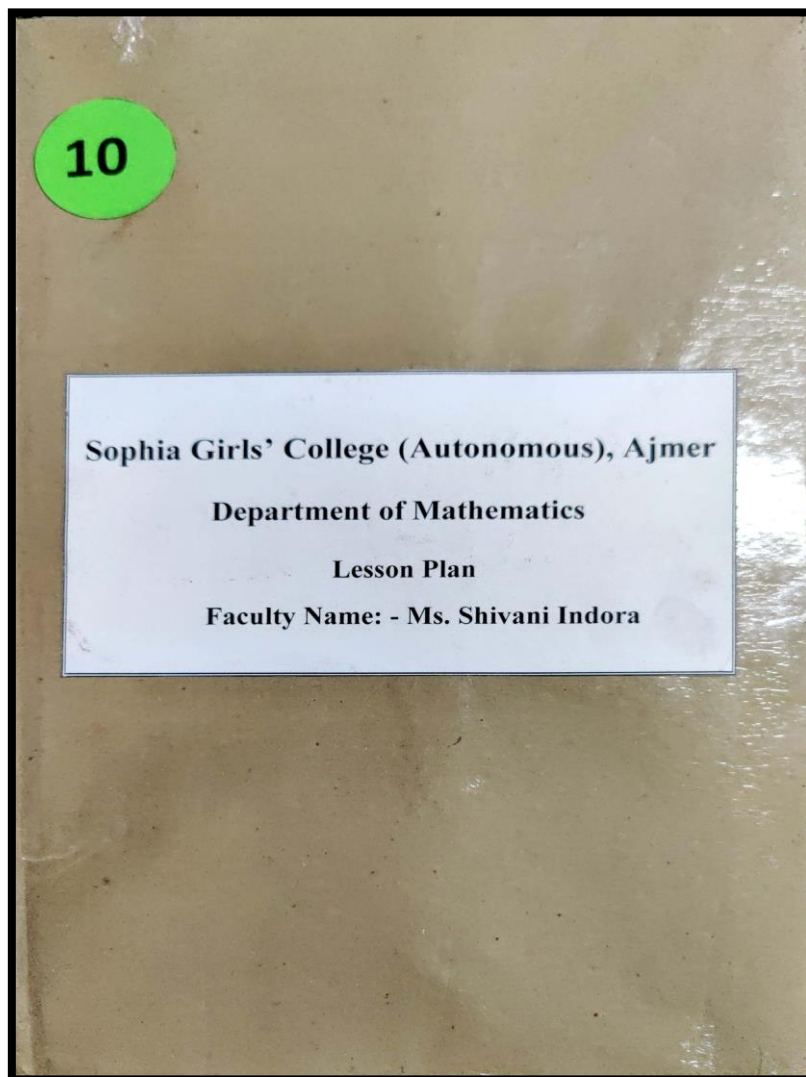




SOPHIA GIRLS' COLLEGE(AUTONOMOUS), AJMER





DATE	PAGE
COURSE PLAN	
2019-2020	
SUBJECT-MATHS	
Submitted by	
Shivani Indora (HOD)	
[M.Sc. (maths), JRF - NET, Ph.D Pursuing]	



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

B. Sc. I (SEMESTER I)

MATRICES (PAPER I) (MAT-101)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	UNIT I Matrix, Types of matrix, Elementary operations on matrices, Symmetric and Skew Symmetric matrices, Hermitian and Skew Hermitian matrices, unitary matrix.	Matrix	Lecture method, PPT	Identify types of Matrix, its rank by using Normal form and Echelon form method and nature of vectors.	<u>Knowledge Based</u> -What is Matrix? -Illustrate the different types of matrix?	Knowledge--60 Understanding-30 Higher Order-10
	Inverse of matrix, Linear Independence of row and column matrices.	Linear combination of vectors	Demonstration through examples, Quiz		<u>Understanding Based</u> -Show that the characteristic roots of a Hermitian matrix are all real	
	Row rank, Column rank and Rank of matrix, Equivalence of column and row rank.	Rank of a matrix	Demonstration through examples, Problem solving classes		-Apply Cayley - Hamilton theorem to find A^{-1} . $A = \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$	
	UNIT II Applications of matrices to	Homogeneous and non-	Group Discussion,			



	solve a system of linear (both homogeneous and non-homogenous) equations, Theorems on consistency of a system of linear equation	Homogeneous system of equation	Demonstration through examples, Quiz	Solve System of Linear Equation by Matrix method, Problems related to Eigen value and Eigen vector.	<u>Higher Order Thinking Skills Based</u> - Justify that the following matrix A satisfies its characteristic equation. $A = \begin{bmatrix} 1 & 4 \\ 4 & 2 \end{bmatrix}$ - Prove that all eigen value of skew symmetric matrix are imaginary or zero.
	Eigen values, Eigen vectors and the Characteristic equation of a matrix, Cayley - Hamilton theorem and its use in finding Inverse of a matrix.	Cayley - Hamilton theorem	Demonstration through examples, Problem solving class		
SEPTEMBER-OCTOBER	UNIT III Relation between roots and coefficients of general polynomial equation in one variable Transformation of equations.	General properties of polynomial equation	Lecture Method, Quiz	Evaluate roots of Cubic equation by Cardon method and Biquadratic equations by Ferrari's method.	
	Descartes' rule of signs, Solution of cubic equation by Cardon method, Solution of Biquadratic equations by Ferrari's method.	Solution of cubic and Biquadratic equation.	Demonstration through examples, Problem solving class		
	REVISION CLASSES				

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Shivani
Head

Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

B. Sc. I (SEMESTER I)

ABSTRACT ALGEBRA (PAPER II) (MAT-102)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

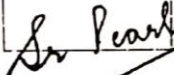
Credit: 04


COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
AUGUST	UNIT I Definition of a group with examples, Order of finite group, General properties of groups, Integral power of an element of a group, Order of an element of a group.	Groups and its properties	Demonstration through examples, Quiz	Explain Groups, general properties of groups and Application of Lagrange's theorem.	<u>Knowledge Based</u> -What is an Abelian group? - Define Kernel of Homomorphism.	Knowledge--60 Understanding-30 Higher Order-10
	Subgroup, Generation of groups. Cyclic group, cosets decomposition, Lagrange's theorem and its consequences.	Subgroups	Lecture method, Problem solving class		<u>Understanding Based</u> -List four properties of an abelian group. -Distinguish between Proper and improper normal subgroup with example.	
	UNIT II Normal subgroups and Quotient groups, Permutation, permutation group, cyclic permutation, Even and odd	Normal subgroup and its properties, Permutation group	Lecture method	Analyze Normal subgroups, Quotient group,		



	permutation, The alternating group A_n .			permutation group and Morphism of group	
	Morphism of groups, Homomorphism and isomorphism, The fundamental theorem of homomorphism.	Group Morphism	PPT, Lecture method. Problem solving class		<p><u>Higher Order Thinking Skills Based</u></p> <p>- Prove that if a, b are any two elements of G then G is abelian group $\Leftrightarrow (ab)^2 = a^2b^2$.</p> <p>- Construct the operation table for $G = \{1, -1, i, -i; x\}$</p>
OCTOBER-NOVEMBER	UNIT III Ring, ring with unity, zero divisors, integral domain and field and their properties. Characteristic of a ring and integral domain, Subring, subfield, prime field, Ring morphism.	Ring and their Subrings	Demonstration through Examples	Solve problem related to Ring, Ideals, Quotient rings, Integral domains, and Fields.	
	Ideals (Principle, Prime and Maximal) and field of quotients of an Integral Domain.	Ideals	PPT, Demonstration through examples.		
REVISION CLASSES					


 PRINCIPAL
 SOPHIA GIRLS' COLLEGE
 (AUTONOMOUS)
 AJMER


 Head
 Department of Mathematics
 Sophia Girls' College
 (Autonomous), Ajmer



SOPHIA GIRLS' COLLEGE, AJMER (AUTONOMOUS)

B. Sc. HONOURS SEMESTER III

LINEAR ALGEBRA (PAPER I) (MAT-301)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM III Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
AUGUST	UNIT I Vector space: Definition and examples of vector space, subspace, sum and direct sum of subspace, linear span, linear dependence, independence and their basic properties.	Vector space	PPT, Demonstration through theorems	Explain the concepts of vector spaces, subspaces, basis, dimension and their properties.	<u>Knowledge Based</u> -What is Subspace of a vector space? - Define Basis of a vector space. <u>Understanding Based</u> -Construct a standard basis for $V_3(\mathbb{R})$ List four Properties of an Eigen value.	Knowledge--50 Understanding-35 Higher Order-15
	Basis, Finitely generated vector space, Existence theorem for basis of a finitely generated vector space, Invariance of the number of elements of basis set, dimensions, Quotient space and its dimension.	Basis and Dimension of a Vector space	Demonstration through examples and theorems, Problem solving class			



SEPTEMBER-
OCTOBER

<p>UNIT III Eigen values and Eigen vectors, similar matrices, equivalent matrices, minimal polynomial.</p>	<p>Properties of Eigen value of matrix A</p>	<p>Quiz, Demonstration through examples</p>	<p>Compute Eigen values and Eigen vectors, minimal polynomial, Jordan Canonical of Matrix.</p>	<p><u>Higher Order Thinking Skills Based</u></p> <p>-Prove that all Eigen values of an Idempotent matrix are either zero or unity.</p> <p>-Evaluate Eigen values of the matrix</p> $A = \begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$
<p>Diagonalization of matrices, Jordan blocks and Jordan forms.</p>	<p>Diagonalizable matrix</p>	<p>Demonstration through examples, Problem solving class</p>	<p>Construct Homomorphism of vector space, matrix related to linear transformation and verify Sylvester law of nullity.</p>	
<p>UNIT II Homomorphism and isomorphism of vector space, theorems on space morphism, Rank and Nullity, Sylvester law of nullity, Algebra of linear transformation.</p>	<p>Homomorphism of Vector space</p>	<p>PPT, Demonstration through examples and theorems</p>	<p>Demonstration through examples, Problem solving class</p>	
<p>Dual spaces, Bidual spaces, Adjoint of a linear transformation, Matrix representation of a linear transformation.</p>	<p>Matrix of Linear transformation</p>	<p>Demonstration through examples, Problem solving class</p>	<p>REVISION CLASSES</p>	

Sr Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Shivani
Head
Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer



B. Sc. II (SEMESTER III)

SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

DIFFERENTIAL EQUATIONS (PAPER II) (MAT-302)

Max. Marks: 100 (70 External: 30 Internal)

Min. Marks: 40 (28 External: 12 Internal)


Credit: 04

COURSE PLAN

SEM III Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY - AUGUST	UNIT I Concept and formation of a differential equation, Order and degree of a differential equation, Differential equations of first order and first degree, Bernoulli's equation, Exact differential equation, integrating factors.	Differential equations of first order and first degree.	Demonstration through examples, Quiz	Formulate the ordinary the Ordinary differential equation and solve Differential equations of first order and first degree.	<u>Knowledge Based</u> -What do you mean by Linear Differential equation? -Define order of partial differential equation. <u>Understanding Based</u> -Solve : $x^2 dy = y^2 dx$ -Distinguish between Ordinary differential equation and Partial differential equation.	Knowledge--50 Understanding-35 Higher Order-15
	First order higher degree equations solving for x, y, p. Lagrange's equation, Clairaut's equation, equation reducible to Clairaut's form, Singular solution.	Differential equations of first order and higher degree.	Demonstration through examples, Problem solving class			



	UNIT III Partial differential equation: Formation, order and degree, linear and non-linear partial differential equation of first order. Complete solution, singular solution, General solution, solution of Lagrange's linear equations, non-linear partial differential equation of first order: solution by four standard forms. Solution of non-linear differential equation by Charpit's method	Solution of linear and non-linear partial differential equation of first order.	Demonstration through examples. Quiz	Solve non- linear Partial differential equation by Charpit's method, Homogeneous and non- Homogeneous linear partial differential equation with constant coefficients.	<i>Higher Order Thinking Skills Based</i> - Solve : $p q = x y$ -Formulate differential equation of the following family of curves: $y = ax + by$
	Homogeneous and non- Homogeneous linear partial differential equation with constant coefficients, Partial differential equation with variable coefficients reducible to equations with constant coefficients, their complementary function and particular integrals.	Partial differential equation with constant and variable coefficients	Group discussion, Demonstration through examples, Problem solving class		
OCTOBER- NOVEMBER	UNIT II Linear differential equations	Linear differential equations with constant	Demonstration through	Learn various techniques of	


Head
Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer



with constant coefficients. Homogeneous and non-homogeneous linear ordinary differential equation, Geometrical meaning of a differential equation and orthogonal trajectories.	coefficients.	examples, Quiz	getting solutions of linear differential equations with constant coefficients, linear differential equation of second order.		
Linear differential equation of second order; Reduction to normal form, Method of variations of parameters, Ordinary Simultaneous differential equations. Simultaneous equation of the form $dx/P = dy/Q = dz/R$. REVISION CLASSES	Linear differential equation of second order.	Demonstration through examples. Problem solving class			


PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER


Head
Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer



SOPHIA GIRLS' COLLEGE, AJMER (AUTONOMOUS)
B. Sc. III (SEMESTER V)
METRIC SPACES AND COMPLEX ANALYSIS (PAPER I) (MAT -501)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
AUGUST- SEPTEMBER	UNIT I Definition and examples of a metric space, Diameter of a set, Bounded set, Open sphere, Closed sphere, Open set, Properties of open set.	Metric space and Open set	PPT, Demonstration through examples and theorems	Explain several standard concepts of Metric space and their properties, Open and Closed sets.	<u>Knowledge Based</u> -What do you mean by metric space? -Define an open sphere?	Knowledge--40 Understanding-35 Higher Order-25
	Interior point and interior of a set, Closed set, Properties of closed set, Limit point of a set, Derived and closure of a set, Boundary point of a set.	Limit Point and Closed set	3-D Models, Quiz, Demonstration through theorems, Problem solving class		<u>Understanding Based</u> -Compare the properties of open and closed set. -List four transformation used in Conformal Mapping.	
	UNIT II Continuity and Differentiability of complex valued function, Analytic function, Necessary	Differentiability of complex valued function	Demonstration through examples, Quiz		<u>Higher Order</u>	



	and sufficient condition for analytic function, Cauchy – Riemann Equations (Cartesian and Polar form)			Analyze Analyticity of function and Construct analytic function by Milne Thomson method.	<i>Thinking Skills Based</i> -Prove that each open sphere is an open set . -Create an open sphere for $S_d(1, 2)$ where d is a usual mapping.
	Harmonic function, Conjugate Harmonic function, Construction of an analytic function by Milne Thomson method.	Analytic Functions	Group Discussion, Demonstration through examples, Problem solving class		
OCTOBER-NOVEMBER	UNIT III Conformal mapping, Isogonal mapping, Necessary and sufficient conditions for a conformal mapping. Some elementary transformations: Translation, Rotation, Magnification, Inversion.	Conformal mapping	3-D Models, Demonstration through examples	Apply the concepts of the conformal mapping , Bilinear transformation in real life problems.	
	Linear transformation, Bilinear transformation, Properties of Bilinear transformation, Cross ratio, Invariant point of Bilinear transformation.	Bilinear transformation	PPT, Demonstration through examples, Problem solving class		
	REVISION CLASSES				

Sr Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE

Srinivas
Head
Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Shivani

Head
Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)
B. Sc. III (SEMESTER V)
LINEAR PROGRAMMING (PAPER II) (MAT -502)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	UNIT I Linear programming problem: Definition of Linear programming problem, Formulation and Solution of Linear programming problem, Feasible solution.	Graphical approach to solve LPP	PPT, Demonstration through examples	Explain several standard concepts of Metric space and their properties, Open and Closed sets.	<u>Knowledge Based</u> -What is LPP? -Define Dual problem. <u>Understanding Based</u> -Compare Big –M method and two phase method. -Classify the component of LPP.	Knowledge--40 Understanding-35 Higher Order-25
	Basic Feasible solution, Optimal solution, Convex set and their properties, Hyperplane, Basic solutions and properties.	Convex set and its properties	Group discussion, Demonstration through examples, Problem Solving class			
	UNIT II Theory of Simplex method, Fundamental Theorem of	Simplex method to solve LPP	Demonstration through examples			



	Linear Programming (Statement only), The Simplex algorithm, Simplex method in tableau format			Analyze Analyticity of function and Construct analytic function by Milne Thomson method.	<i>Higher Order Thinking Skills Based</i> -prove that intersection of two convex set is convex set. -Maximize the L.P.P $\text{Max } z = 4x + 2y$ $5x + 4y = 2$ $4x + 5y = 5$
	introduction to artificial variables, case of unbounded solutions, Big- M method, Two phase method, Degeneracy in linear programming problem.	Degeneracy in linear programming problem	Demonstration through examples, Group discussion, Problem solving class		
OCTOBER-NOVEMBER	UNIT III Duality in Linear programming problem: Formulation of the dual problem, Primal-Dual relationships, Symmetric and Un-symmetric dual problem with restriction in sign, Theorems related to dual problem.	Primal-Dual relationships	Demonstration through examples, Quiz	Apply the concepts of the conformal mapping, Bilinear transformation in real life problems.	
	Revised Simplex method (standard form I and II).	Revised Simplex method	Demonstration through examples, Problem solving class		

Sr Pearl

PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

REVISION CLASSES

Shivani
Head

Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

B. Sc. I (SEMESTER II)

Vector calculus and Geometry (PAPER I) (MAT-201)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM II Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
FEBRUARY	UNIT I Vector differentiation, Gradient, Divergence and Curl, Identities involving these operators and related problems.	Vector differentiation	Lecture method, PPT, Quiz	Evaluate vector Differentiation , gradient, divergence, curl, line integral and surface integral.	<u>Knowledge Based</u> - Define divergence of vector point function. - Find: $\int f(t) dt$ Where, $f(t) = \sin t \hat{i}$ $+ 2t^3 \hat{j} + \cos t \hat{k}$	Knowledge--60 Understanding-30 Higher Order-10
	Vector integration, Line and surface integral, Theorem of Gauss, Green's and Stoke's.	Vector integration	Demonstration through examples, problem solving class, Test		<u>Understanding Based</u> - Evaluate $\frac{\partial^2 \vec{a}}{\partial x^2}$;	



	UNIT II General equation of second degree, Tracing of conics, centre of a conic, coordinates of the centre. Equation of the conic referred to centre as origin, Asymptotes of a conic, Length and position of axes of a standard conic, Tracing of Ellipse, Parabola and Hyperbola.	Tracing of Ellipse, Parabola and Hyperbola.	Demonstration through examples, Quiz, PPT		If $\vec{a} = (x - 2y)\hat{j}$. - Derive equation of conic section in its simplest form. <u>Higher Order Thinking Skills Based</u> - Evaluate the equations of the axes of the conic: $4x^2 + 9xy + 4y^2 = 1$ - Evaluate $\int F \cdot dr$, where $F = (x^2 + y^2)\hat{i}$ and curve C is the
	The Polar equation of Conic: polar equation of a straight line, circle and conic chord, Auxiliary circle, Tracing of conic $l/r = 1 + e \cos \theta$.	Tracing of conic $l/r = 1 + e \cos \theta$.	Demonstration through examples, Problem solving class, Test		
MARCH - APRIL	UNIT III Sphere, Plane section of a sphere, tangent line and	Properties of Sphere	Lecture Method, Quiz, PPT	Solve Problem related to 3-Dimensional	



	tangent plane of sphere.			figure like Sphere, Cone and Cylinder.	rectangle in the xy plane bounded by $x = 0, x = a,$ $y = 0, y = b$	
	Cone, Enveloping cone, Tangent plane of cone, Reciprocal cone.	Properties of Cone	Demonstration through examples, Problem solving class, PPT			
	Cylinder, Right circular cylinder, enveloping cylinder. Revision Class	Properties of Cylinder	Demonstration through examples, Problem solving class			

Sr. Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Sr. Pearl
Head
Department of Mathematics
Sophia Girls' College
(Autonomous), Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

B. Sc. I (SEMESTER II)

Advanced Calculus (PAPER II) (MAT-202)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

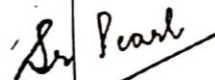
Credit: 04


COURSE PLAN

SEM II Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER -JANUARY	UNIT II Partial Differentiation, Change of variables, Euler's theorem on homogeneous functions, Differentiation of implicit functions, Jacobians	Partial Differentiation	Demonstration through examples, Quiz	Evaluate Maxima, Minima and saddle points of function of two variables.	<u>Knowledge Based</u> - State Euler's theorem on homogeneous functions	Knowledge--60 Understanding-30 Higher Order-10
	Envelopes, Evolutes, Maxima, Minima and saddle points of function of two variables.	Envelopes and Nature of point.	Lecture method, Problem solving class		- Define centre of curvature.	
	UNIT I Derivative of length of an arc, Asymptotes in Cartesian coordinates, intersection of curve and its asymptote, Curvature, radius of curvature for (Cartesian, polar, parametric and pedal curves)	Asymptote in Cartesian coordinate and curvature	Lecture method, Group Discussion	Sketch curves in Cartesian and polar coordinate systems.	<u>Understanding Based</u> -List four properties of Gamma function. - Evaluate the pedal equation of the	



	Curvature, centre of curvature, chord of curvature				Cardioid $r = a(1 - \cos\theta)$
	Tests for concavity and convexity, test for point of inflexion, singular points, curve tracing(in Cartesian and polar co-ordinates).	Curve tracing in Cartesian and polar coordinate	Lecture method, Problem solving class, Test		<u>Higher Order Thinking Skills Based</u>
MARCH - APRIL	UNIT III Beta and Gamma function, Double integral, change of order of integration. Triple integral, Dirichlet's integral and Liouville's extension of dirichlet's integral (statement only). Revision Class	Deal with the property of beta function, gamma function and double integral Triple integral property	Demonstration through Examples, Group discussion PPT, Demonstration through Examples	Solve Problem related to beta function, Gamma function, Double integral and Triple integral	- Determine the envelope of the family of following straight line, where m is a parameter. $y = mx + am^p$ - Evaluate the radius of curvature at (1, 2) on the curve $xy = c^2$.


 PRINCIPAL
 SOPHIA GIRLS' COLLEGE
 (AUTONOMOUS)
 AJMER


 Head
 Department of Mathematics
 Sophia Girls' College
 (Autonomous), Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

B. Sc. II (SEMESTER IV)

Real Analysis (PAPER I) (MAT-401)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM IV Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER - JANUARY	UNIT I Real number system as a complete ordered field: Field and its properties, ordered field, lower bound, upper bound, supremum and infimum of sets, the completeness property of Real number system, the Archimedean property.	properties of the Real number system	PPT, Demonstration through theorems and examples.	Explain properties of the Real number \mathbb{R} and nature of Real Sequences.	<u>Knowledge Based</u> - Define Divergent Sequence. - Differentiate between Oscillating and Convergent series. <u>Understanding Based</u> -Show that every convergent sequence is bounded but converse not true.	Knowledge--50 Understanding-35 Higher Order-15
	Definition of sequence theorems on limits of sequences, bounded and monotonic sequences, Cauchy's convergence	Convergence criteria of sequence.	Demonstration through examples and theorems, Problem solving class			



	critereon.				- Prove that the following sequence converges to '0'.	
FEBRUARY	UNIT II Infinite series of non-negative terms, different tests of convergence of infinite series comparison test, ratio test, Logarithmic, Morgen and Bertrand test (without proof).	Nature of infinite series	Demonstration through examples, Group Discussion	Apply the ratio, Leibnitz', Cauchy n th root test for Convergence of an Infinite series of Real number.	$< \frac{1}{2^n} >$	
	Alternating series, Leibnitz' theorem Absolute and conditional convergence, Pointwise convergence of sequence of functions, Uniform convergence	Nature of alternating series, Uniform convergence	Demonstration through examples, Problem solving class, Test		<u>Higher Order Thinking Skills Based</u> - State and Prove Betweenness theorem. - Show that the following series is convergent.	
MARCH - APRIL	UNIT III Limit, continuity, differentiability of two variable functions.	Limit, continuity, differentiability test.	PPT, Lecture method	Test Continuity and Differentiability of two variable function and the application of mean value Theorem.	$\sum \left(\frac{n}{n+1} \right)^{n^2}$	



	Mean value theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Riemann integral, Fundamental theorem of integral calculus. Revision Class	Mean value theorems and , Riemann integral	Demonstration through examples, Problem solving class, Test			
--	---	--	---	--	--	--

Sr Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Shivani
Head
Department of Mathematics
Sophia Girls' College
(Autonomous) , Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)

B. Sc. II (SEMESTER IV)

Mechanics (PAPER II) (MAT-402)

Max. Marks: 100 (70 External; 30 Internal)

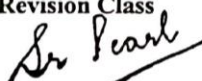

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM IV Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JANUARY	UNIT II Kinematics and Kinetics Rectilinear motion, Velocity and acceleration along radial, transverse, tangential and normal directions, Simple harmonic motion.	Kinematics and Rectilinear motion	Lecture method, PPT, Group Discussion	Deal with the Kinematics and Kinetics of the rectilinear motions of a particle, Problem related to horizontal and vertical elastic string.	<u>Knowledge Based</u> - What do you mean by Tangential and normal velocity? - State Lami's theorem. <u>Understanding Based</u> - Evaluate velocity at a point P, when motion of particle under simple harmonic motion. - A sphere of radius r	Knowledge--50 Understanding-35 Higher Order-15
	Rectilinear motion in resisting medium, Hook's law and related problems.	resisting medium and string related problems.	Demonstration through examples, Problem solving class			



FEBRUARY	UNIT I General Conditions of equilibrium of coplanar forces: Reduction of coplanar forces into a force with couple, Equilibrium of a rigid body under three forces, Equilibrium of rigid body under more than three forces. Friction, Common Catenary.	equilibrium of coplanar forces Friction and Catenary problem	Demonstration through examples, Group discussion, Problem solving class	Explain necessary conditions for the equilibrium of Coplanar Forces and Application of Friction.	rests against a smooth vertical wall which it is attached by a string of length l fastened to a point on the surface. Find the tension in the string. <u>Higher Order Thinking Skills Based</u> - Evaluate radial and transverse acceleration of a particle if its radial and transverse velocity be Δr^2 and $\mu \theta^2$	
MARCH-APRIL	UNIT III Constrained motion in vertical and horizontal circles, central orbit, inverse square law (Planetary motion), Impact (Direct and Oblique). Revision Class  PRINCIPAL SOPHIA GIRLS' COLLEGE (AUTONOMOUS) AJMER	Constrained motion and Direct and Oblique impact	Demonstration through examples, Problem solving class	Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions.	In a ΔABC , G be any point in the base BC, dividing it into two segments m and n then prove that: $(m + n)\cot\theta =$ $ncotA - mcotB$	 Head Department of Mathematics Sophia Girls' College (Autonomous), Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)
B. Sc. III (SEMESTER VI)
Statistics (PAPER I) (MAT -601)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM VI Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER - JANUARY	UNIT I Random experiment, Sample space, Definition of Probability, Conditional probability, Addition theorem of probability, Multiplication theorem of compound probability, Baye's theorem.	Probability	Demonstration through examples and theorems, Quiz	Apply several concepts of Probability, Application of Baye's theorem, Regression and Correlation Coefficient for solving real life situation.	<u>Knowledge Based</u> -Define Correlation Coefficient and Regression Coefficients. - Find the probability of throwing a number greater than 4 in a single throw with a die.	Knowledge--40 Understanding-35 Higher Order-25
	Random variate, Probability distribution, Mathematical expectation, Moment, Mathematical expectation of the Sum and product of two random variate, Covariance, Curve fitting, Regression and Correlation Coefficient.	Mathematical expectation, Regression and Correlation Coefficient.	Lecture method, Problem solving class		<u>Understanding Based</u> - Show that if 4 cards are drawn at random from a pack	



	UNIT II Moment Generating Functions, Theorems on moment generating function, Cumulants, Properties of Cumulants, Characteristic function.	Moment Generating Functions and Cumulants.	Demonstration through examples, Quiz	Explain Discrete probability distributions like Binomial and Poisson distribution.	of 52 cards then the probability of getting 2 spade cards and 2 heart is $468/20825$. - Show that first two moments of poisson distribution about origin are m and $m^2 + m$. <u>Higher Order Thinking Skills Based</u>
	Discrete probability distributions: Binomial, Poisson distribution and their Mean, Variance, Moment, Recurrence relation, Moment generating function.	Binomial and Poisson distribution	Group Discussion, Demonstration through examples, Problem solving class		- Evaluate mean for Binominal distribution.
MARCH-APRIL	UNIT III Continuous probability distribution: Rectangular distribution, Normal distribution, derivation of normal distribution from binomial distribution, Mean, Variance, Moment, Recurrence relation, Moment generating function, Additive property of normal distribution, Problems related to area property of normal	Normal distribution	Demonstration through examples, PPT, Problem solving class, Test	Solve Problems related to Rectangular Distribution and area property of normal distribution.	- Evaluate the probability of getting 6 atleast 3 times when a die is thrown 5 times.



	distribution.					
	Revision Class					

Sr Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER

Shivani
Head
Department of **Mathematics**
Sophia Girls' College
(Autonomous), Ajmer



SOPHIA GIRL'S COLLEGE, AJMER (AUTONOMOUS)
B. Sc. III (SEMESTER VI)
NUMERICAL ANALYSIS (PAPER II) (MAT -602)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM VI Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
FEBRUARY	UNIT I Numerical operators, Properties of operators, Fundamental theorem of difference calculus, Factorial function.	Properties of Numerical operators	PPT, Demonstration through examples	Learn about various Numerical operators, interpolating and extrapolating methods.	<u>Knowledge Based</u> - Evaluate $\Delta (ae^{bx})$, $h = 2$ - Write relation between ordinary and divided differences.	Knowledge--40 Understanding- 35 Higher Order- 25
	Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formula.	Interpolation with equal intervals	Group discussion, Demonstration through examples, Problem Solving class		<u>Understanding Based</u> - Express the following function and its differences in factorial notation using synthetic division method.	



	UNIT II Divided differences and their properties, Newton's formula for unequal intervals, Lagrange's formula, Central difference, Gauss forward and backward formula, Stirling interpolation formula Bessel formula.	Interpolation with unequal intervals	Demonstration through examples, PPT	Solve question related to unequal intervals by using Newton's formula, Lagrange's formula.	$4x^3 - x^2 + 2x + 20$ - Evaluate $f(a,b)$. If $f(x) = \frac{1}{x^2}$ <u>Higher Order Thinking Skills Based</u>
	Numerical Differentiation: Derivative from interpolation formulae, approximate expressions for the derivatives of a function.	Numerical Differentiation	Demonstration through examples, Group discussion, Problem solving class, PPT		- Find the polynomial of the lowest degree which assumes the values 2, 10, 12, -1 when x has values 5, 2, 1, -2 respectively.
MARCH-APRIL	UNIT III Numerical Integration: General quadrature formula for equidistant ordinates, Trapezoidal, Simpson's one-third, three-eighth rule, Weddle's rule, Gauss' Quadrature formula, Euler –	Numerical Integration	Lecture method, PPT	Evaluate Numerical Integration by General quadrature formula, Trapezoidal, Simpson's one-third,	- Explain Sheppard's Central Difference Operators.



	McLaurin's summation formula			three-eighth rule.		
	Solution of algebraic and transcendental equation, Newton Rapson method and Regular Falsi method. Revision Class <i>Sr Pearl</i> PRINCIPAL SOPHIA GIRLS' COLLEGE (AUTONOMOUS) AJMER	Solution of algebraic and transcendental equation	Demonstration through examples, Problem solving class, PPT			<i>Sr Pearl</i> Head Department of Mathematics Sophia Girls' College (Autonomous), Ajmer

Sr Pearl
PRINCIPAL
SOPHIA GIRLS' COLLEGE
(AUTONOMOUS)
AJMER